



SECTION 3.0: OPERATING INSTRUCTIONS

CAUTIONS ✓

- ✓ Bird Products Corporation bacteria filters are compatible with steam autoclaving "ONLY" Do not wash, rinse, soak, pasteurize, ethylene oxide sterilize, or immerse bacteria filters in liquid sterilizing agents as resistance to flow will be increased.
- ✓ Do not sterilize the V.I.P. BIRD. The internal components are not compatible with sterilization techniques.
- ✓ Sterilizing agents which include phenols, dimethyl ammonia chloride, chloride compounds, and greater than 2% glutaraldehyde may cause damage to plastic components.

3.5 TROUBLESHOOTING GUIDE

Symptom	Indicated By	Possible Causes	Corrective Action
High peak insp. press.	High Pressure Limit alarm	(1) Change in patient status, deteriorating C and R. (2) Patient needs suctioning: endotracheal tube obstruction.	(1) Re-evaluate patient and alarm setting. (2) Suction patient.
		(3) Kinked or occluded proximal airway line or inspiratory/expiratory leg of patient circuit (4) Improperly set alarm.	(3) Eliminate the kink or occlusion. Check integrity of exhalation valve. (4) Re-evaluate the alarm setting.
High peak insp. press./ high PEEP/ CPAP	High Prolonged Press. alarm	(1) Kinked or occluded proximal airway line or expiratory leg of patient circuit.	(1) Eliminate the kink or occlusion. Check integrity of exhalation valve.
Low peak insp. press.	Low Peak Press. alarm	(1) Patient disconnect.	(1) Re-connect the patient.

3.5 Troubleshooting Guide

Symptom	Indicated By	Possible Causes	Corrective Action
Low PEEP/CPAP	Low PEEP/CPAP alarm	(1) Leaks in the patient circuit. (2) Change in patient status; Improved C and R (3) Kinked or occluded inspiratory leg of patient circuit. (4) Improperly set alarm. (5) Patient Disconnect	(1) Perform leak test; eliminate leaks. (2) Re-evaluate the patient and alarm setting. (3) Eliminate the kink or occlusion. Check integrity of exhalation valve. (4) Re-evaluate the alarm setting. (5) Re-connect patient.
Low breath rate/apnea	Apnea alarm	(1) Change in patient's status; decreased spontaneous rate. (2) Improper adjustment of Assist Sensitivity. (3) Leak in patient circuit.	(1) Re-evaluate patient and ventilator settings. (2) Re-evaluate Assist Sensitivity setting. (3) Perform leak test; eliminate leaks.
I:E Ratio inverted	Colon in I:E Ratio display flashing	(1) Breath Rate and Inspiratory Time settings yield Exp. Time < Insp. Time. (2) Breath Rate, Flow, and Tidal Volume settings yield Exp. Time < Insp. Time.	(1) If inverse I:E Ratio is undesirable, re-evaluate control settings.
20 PSIG difference in air and O ₂ inlet press.	Sharp pneumatic audible alarm with no visual	(1) 20 PSIG difference in gas pressures.	(1) Restore or adjust gas pressures.



SECTION 3.0: OPERATING INSTRUCTIONS

Symptom	Indicated By	Possible Causes	Corrective Action
Low inlet gas pressure	Low Inlet Gas alarm	Gas pressure downstream of accumulator is < 22.5 or > 27.5 PSIG due to inlet gas pressures, dirty inlet filter, regulator or blender malfunction.	(1) Restore gas pressures. (2) Replace inlet gas filter. (3) Refer to an authorized service technician.
Ventilator Inoperative	Ventilator inoperative LED illuminated and audible alarm	(1) Loss of electrical power. (2) System failure. (3) Extended low or high internally regulated gas pressure.	(1) Check both ends of power cord and insure Proper connection. Restore A.C. power. (2) Refer to an authorized service technician. (3) Restore gas pressures.
Ventilator unable to power up (AC Line operation)	Display panel blank and no audible alarm	(1) No electrical power. (2) Fuse blown. System failure. (3) Alternate power switch set for external power source.	(1) Restore electrical power. (2) Refer for service. (3) Set switch for AC line power.
Ventilator unable to power up (External power operation)	Display panel blank and no audible alarm.	(1) Alternate power switch set for AC line power. (2) System failure. (3) External power supply lost charge or improperly connected.	(1) Set switch for external power source. (2) Refer for service. (3) Check for proper connection and sufficient charge.

3.5 Troubleshooting Guide

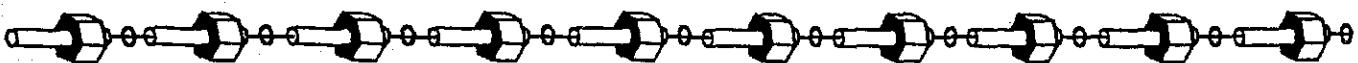
Symptom	Indicated By	Possible Causes	Corrective Action
Insp./Exp. leg of patient circuit or proximal line kinked, occluded, or open	Circuit fault flashing and audible alarm.	(1) Insp./Exp. leg or proximal kinked, occluded, or open, (2) Pressure transducer fault.	(1) Examine circuit and circuit and correct problem. (2) Refer for service.
No High Press. Limit or High Prolonged Press. alarm with increase in peak insp. pressure.	Increase in pressure on proximal airway press. gauge.	(1) Exp. leg or proximal line kinked or occluded. and (2) Over-Pressure Relief Valve set less than 15 cmH ₂ O above High Press. Limit control setting in IMV/CPAP or less than 5 cmH ₂ O above High Pressure Limit alarm setting in Assist/Control and SIMV/CPAP.	(1) Examine circuit and correct problem. and (2) Re-set Over-Press. Relief valve correctly.

Section 4.0

Maintenance & Service

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V.I.P. BIRD® Infant-Pediatric Ventilator
Service Manual





SECTION 4.0: MAINTENANCE AND SERVICE

4.1

MAINTENANCE AND SERVICE POLICY

WARNING !

A V.I.P. BIRD Ventilator which is not functioning or does not meet manufacturer's design and performance specifications should not be used until all necessary repairs have been made. Contact your Bird distributor or Bird Products Corporation for repairs.

CAUTION ✓

The V.I.P. BIRD should be serviced and/or calibrated by a BIRD PRODUCTS CORPORATION trained service technician.

BIRD PRODUCTS CORPORATION equipment has been designed to provide the maximum amount of utilization with a minimum amount of maintenance. When determining the desired frequency of maintenance, many variables must be considered.

- Frequency and length of use.
- Cleanliness of the compressed air source.
- Use of an air inlet water trap/filter.

The V.I.P. BIRD, like other items of health care equipment, will require routine maintenance over a period of time. Refer to the following for recommended maintenance intervals.

V.I.P. BIRD Recommended Maintenance Schedule

ROUTINELY: Replace any damaged, leaking or worn:

- Tubing
- Adapters
- Exhalation valve diaphragm
- Air inlet filter bowl/o-ring

Every 1000 Hours: Replace air inlet water trap filter element with a new element, P/N 06146.

Calibrate pressure transducers, (Refer to 3.8, Operational Verification Procedures, in this section) of this manual for calibration procedure. If accuracy varies by more than ± 3 cmH₂O, contact your Bird distributor or Bird Products Corporation for repair.



SECTION 4.0: MAINTENANCE AND SERVICE

Recommended
Maintenance Schedule
Continued

V.I.P. BIRD Recommended Maintenance Schedule

Every 5000 hours: Replace nylon cone filters (P/N 06804) in the air and oxygen inlet fittings.

Replace the main flow and proximal bacteria filters. These filters should be replaced more often if the resistance to flow through the filter exceeds the maximum allowable limit.

(Adult) - Main Flow Filter - 2cmH₂O @ 60 LPM
(Infant) - Main Flow Filter - 4cmH₂O @ 20 LPM
Proximal Airway Filter - 1cmH₂O

Every 15,000 hours: A complete machine maintenance will be required at a minimum of once every 15,000 machine hours. Contact your Bird distributor or Bird Products Corporation.

4.2

PERFORMANCE TEST

NOTE

Ensure that the pressure gauge reads zero with the ventilator ON/OFF switch in the OFF position, prior to testing the resistance of the bacteria filters.

4.2.1 Bacteria Filter Testing

Main flow bacteria filter resistance test: Attach the inspiratory limb of the breathing circuit directly to the ventilator outlet. Remove the expiratory limb of the breathing circuit from the patient wye and contact the bacteria filter onto the expiratory side of the patient wye. observe proper flow direction. Turn ventilator ON, Cap the patient connection of the wye and adjust the ventilator as follows:

Main Flow	Infant Main Flow
Mode: Assist/Control Tidal Volume: 500 ml. Breath Rate: 12 BPM Peak Flow: 60 LPM	Mode: IMV/CPAP Inspiratory Time: 1.0 sec. Breath Rate: 12 BPM Peak Flow: 20 LPM

4.1 Maintenance and Service Policy

4.2 Performance Test

Observe the peak inspiratory pressure on the pressure gauge. Remove the filter and observe the peak inspiratory pressure. Should the observed pressure values differ by more than 2cmH₂O or more for the (Adult) Main Flow filter, or 4cmH₂O or more for the (Infant) Main Flow filter, the filter must be replaced.

Proximal airway bacteria filter resistance test:

NOTE

It is not necessary to connect a complete breathing circuit to the ventilator for testing the Proximal airway bacteria filter.

Connect the Proximal airway line with the filter to the fitting on the front of the ventilator. Turn ventilator ON and observe the pressure reading on the pressure gauge. Remove the filter and short length of tubing and connect the longer length of tubing to the front of the ventilator. Should the observed pressure values differ by more than 1 cmH₂O, the filter must be replaced.

4.2.2 Built-In Diagnostics

Power-On Self Test (POST): These diagnostics occur each time the ventilator is turned on or the ventilator resumes operation after a recoverable Ventilator Inoperative condition. The purpose of the test is to ensure operational integrity of each of the ventilator microprocessors and their associated hardware. In approximately two seconds, the functions listed below are tested. During a successful POST, the display segments will rotate and the following sequence of numbers will appear on the Monitor Display; "213", "214", "215", and "226". If any of the tests do not pass, the ventilator will enter a Ventilator Inoperative alarm condition and the corresponding Error Code will be displayed on the Monitor Display. To assist the service technician in troubleshooting, the clinician should record the Error Code before turning the ventilator power switch off.

INTER-PROCESSOR INTERRUPT TEST

Test	P.O.S.T. Fault Code
• CPU C - CPUB	230
• CPU B - CPUC	220
• CPU B - CPU A	221
• CPU A - CPUB	211

INTERNAL TIMER TEST

Test	P.O.S.T. Fault Code
• CPU A Timer	212
• CPU B Timer	222
• CPU C Timer	232

*Built-In Diagnostics
Continued*

INTERNAL RAM TEST

Test	P.O.S.T. Fault Code
• CPU A RAM	213
• CPU B RAM	223
• CPU C RAM	233

PROGRAM MEMORY (PROM) CHECKSUM TEST

Test	P.O.S.T. Fault Code
• CPU A Checksum	214
• CPU B Checksum	224
• CPU C Checksum	234

Test	P.O.S.T. Fault Code
Stepper Motor Test	215
Dual-Port RAM A-B Cell Integrity Test	226
Dual-Port RAM C-B Cell Integrity Test	236
Dual-Port RAM A-B Address Test	217
Dual-Port RAM C-B Address Test	227
Dual-Port RAM A-B Inverted Address Test	228
Dual-Port RAM C-B Inverted Address Test	238

After successful completion of the above tests, the ventilator will begin normal operation. For the first four seconds of operation, a self-test of the Alphanumeric Monitor Display is performed. The Monitor Display is not functional during these four seconds, however, the ventilator is operational. If the test fails, the ventilator will attempt to display the message "DISPLAY SELFTEST FAILURE". Depending on the type of failure, the message may not be able to be displayed. Should this failure occur, the monitor will not be capable of displaying any other data.

Continuous System Verification - During the operation of the V.I.P. BIRD, a wide variety of on-going tests are performed. If any of these tests should not pass, the ventilator will enter a Ventilator Inoperative condition and the corresponding Error Code and Message will be displayed on the Monitor Display. The clinician should always record the Error Code and Message before turning the ventilator power switch off. (Refer to Section 4.8.5: VIP BIRD Vent Inop Codes on page 4-111.)

4.2.3 User Verification Tests (UVT)

These diagnostics should be run a minimum of once each month. Before commencing the diagnostics, complete the following steps:

CAUTION

The User Verification Test (UVT) is a diagnostic evaluation that requires precise responses from the operator. If buttons not specified in the test are pushed, unwanted values may be stored in memory.

- Assemble a patient circuit to the ventilator.
- Connect the appropriate air and oxygen sources to the ventilator.
- Set the High Pressure Limit control/alarm to 80 cmH₂O.
- Set the Over-Pressure Relief valve control to maximum (full clockwise).

Begin the User Verification Tests as follows:

- Ventilator Power switch must be OFF.
- While pressing the Monitor Select pushbutton, turn the Power switch ON.

V.I.P. | SECTION 4.0: MAINTENANCE AND SERVICE

- Continue pressing the Monitor Select push button until the Power-On Self Test is complete and the Alphanumeric Monitor Display test begins.
- After the Monitor Display test is completed, the following message will appear on the Monitor Display:

REMOVE PATIENT PRESS SELECT

4.2.3.1 SOFTWARE VERSION CHECK - Press the Monitor Select pushbutton.

- a) The software version level of Microprocessor A will appear on the Monitor Display as follows:

"A:xx.xx"

- b) Press the Monitor Select pushbutton and the software version level of Microprocessor B will appear:

"B:xx.xx"

- c) Press the Monitor Select pushbutton and the software version level of Microprocessor C will appear:

"C:xx.xx"

- d) Press the Monitor Select pushbutton and the software version level of the Watchdog Timer PAL will appear:

"P:xx.xx"

4.2.3.2 LANGUAGE SELECT SWITCH SETTING - Press the Monitor Select pushbutton. The current setting of the requested language will be displayed on the Monitor Display. One of the following will appear:

- "ENGLISH"
- "DEUTSCHE"
- "ESPAÑOL"
- "FRANCAIS"
- "JAPANESE" (in characters)
- "ILLEGAL"

NOTE

If the "ILLEGAL" message appears, the language setting will default to English. At the first available opportunity, the Language Select switch should be checked by a service technician.

4.2.3.3 APNEA INTERVAL SELECT SWITCH SETTING - Press the Monitor Select pushbutton. The current setting for the Apnea Interval will be displayed on the Monitor Display. One of the following will appear:

- "APNEA 20"
- "APNEA 40"
- "APNEA 60"
- "ILLEGAL"

NOTE

If the "ILLEGAL" message appears, the Apnea Interval setting will default to 20 seconds. At the first available opportunity, the Apnea Interval switch should be checked by a service technician.

4.2.3.4 LAMP TEST - Press the Monitor Select pushbutton. The message "LAMP TST" will appear on the Monitor Display. All indicators, except VENT INOP AND EXTERNAL DC, and all segments of the displays will illuminate. Depending on the power source, either POWER or EXTERNAL DC will be illuminated. The operator should verify that all indicators and segments are illuminated. If they are not, the unit should be referred for service.

4.2.3.5 CONTROL TEST - Press the Monitor Select pushbutton. The message "CTRL TST" will appear on the Monitor Display.

a) **MODE CONTROL TEST** - Rotate the Mode control continuously through all three modes. After the first change of mode and at each position, verify that the name of the mode is displayed on the Monitor Display, i.e. "TIME IMV", "VOL A/C", and "VOL SIMV".

NOTE

If the Mode control is placed in between legal positions, the message "SET MODE" will appear.

b) **PUSHBUTTON TESTS** - Press each of the following pushbuttons and verify that the name is displayed on the Monitor Display.



SECTION 4.0: MAINTENANCE AND SERVICE

- Press Alarm Silence ("SILENCE")
- Press Alarm Reset ("RESET")
- Press Manual Breath ("BREATH")

c) CONTROL TESTS - Rotate each control knob on the ventilator verifying that the numbers on the respective display increment from the minimum allowed setting to the maximum allowed setting. Incompatibilities between various control settings may also be verified during this test.

4.2.3.6 AUDIBLE ALARM TEST - Press the Monitor Select pushbutton. The message "AUDIBLE" will appear on the Monitor Display. The operator must verify that the audible alarm is sounding before proceeding to the next test. If the alarm does not sound, the ventilator should be referred to a service technician. **DO NOT PRESS THE SILENCE KEY.**

4.2.3.7 SYSTEM PRESSURE DISPLAY - Press the Monitor Select pushbutton. Verify that the Monitor Display reads 25 ± 0.5 PSI. If the reading is out of range, refer the unit to a service technician.

4.2.3.8 AMBIENT PRESSURE TEST - Press the Monitor Select Pushbutton. The message "0 TST" will appear on the Monitor Display. The ventilator will proceed to test the three pressure transducers under a no flow condition. After 1 second, the results of the test can be obtained by pressing the Monitor Select pushbutton again. If the test passes, the message "0 PASS" will appear. If any transducer fails the test, a specific message will appear, i.e. "PRX FAIL", "EXH FAIL", "MCH FAIL" for the Proximal Transducer, Exhalation Transducer, and Machine Transducer respectively.

4.2.3.9 PRESSURIZED CIRCUIT TEST - Press the Monitor Select Pushbutton. The message "PRSR TST BLOCK PATIENT WYE PRESS SELECT" will appear. The operator must block the patient wye in order to close the patient circuit. Once this is done, the operator should press the Monitor Select pushbutton to proceed. The message "PRSR TST" will appear. The ventilator will pressurize the circuit to 55 to 65 cmH₂O. If this should not occur within five seconds, the message "LOW PRSR" will appear on the Monitor Display. If the pressure is reached within five seconds, the ventilator will proceed to test the three pressure

transducers. After approximately eight seconds, the results will automatically be displayed. If the test passes, the message "PRS PASS" will appear. If any transducer fails the test, a specific message will appear, i.e. "PRX FAIL", "EXH FAIL", "MCH FAIL" for the Proximal Transducer, Exhalation Transducer, and Machine Transducer respectively. If more than one transducer fails, the message "MLT FAIL" will appear.

If any portion of this test fails, it will repeat, starting with the message "PRSR TST BLOCK PATIENT WYE PRESS SELECT", when the Monitor Select pushbutton is pressed. This gives the operator the opportunity to repeat the test. The test will be continuously repeated until it either passes or the operator presses Alarm Reset to terminate UVT. If this test does not pass, the unit should be referred to a service technician.

4.2.3.10 CIRCUIT LEAK TEST - Once the Pressurized Circuit Test passes (i.e. "PRS PASS"), press the Monitor Select pushbutton. Using data collected during the previous test, the ventilator determines the amount of leak in the patient circuit. If this test passes, the message "LEAKPASS" will appear. Pressing the Monitor Select pushbutton will terminate UVT and normal ventilation will begin. If the test failed, the message "HIGHFLOW" or "LEAKFAIL" will be displayed. When the Monitor Select pushbutton is pressed, UVT will return to the beginning of the PRESSURIZED CIRCUIT TEST. The operator has the opportunity to correct any leaks and then repeat the PRESSURIZED CIRCUIT AND CIRCUIT LEAK TEST. The test will be continuously repeated until it either passes or the operator presses Alarm Reset to terminate UVT. If this test does not pass, the unit should be referred to a service technician.

4.2.3.11 SERVICE DIAGNOSTICS TESTS (SDT) - This level of diagnostics is reserved for the trained service technician. It is activated internal to the ventilator.

WARNING !

After completion of the User Verification Tests (UVT), the V.I.P. BIRD MUST be turned off and then turned on to ensure that the ventilator is reset for normal operation.

4.3**V.I.P. BIRD TOOL/EQUIPMENT LIST** **V.I.P. BIRD 15,000 Hour Maintenance-
Recommended Tools and Equipment****4.3.1 Common Tools (Not available from Bird Products Corporation.)****Nutdrivers - (deep socket):**

- $1/4"$
- $5/16"$
- $9/32"$
- $11/32"$
- $3/8"$
- $7/16"$
- $1/2"$

Open End Wrenches:

- $7/16"$
- $1/2"$
- $9/16"$
- $5/8"$
- $11/16"$

Allen Hex Ball End 7" (18 cm) Shank Drivers

- $3/16"$
- $3/32"$
- $7/64"$
- $9/64"$
- $5/32"$

Common Screwdriver - 8" Shank**#2 Phillips Screwdriver - 8" Shank****Long Thin Needle Nose Plier****Diagonal Cutter****Trimpot Adjuster**

4.3 V.I.P. BIRD Tool/Equipment List

4.3.2 Special items required for testing and calibration which may be obtained from Bird Products Corporation under the following part numbers:

P/N	Description
00066	90° Elbow Adapter
00077	Inline Pressure Manometer
00631	Lubricant
00673	Flowmeter Adapter
00680	Tapered Nipple
00822	Hex Nut
01233	22mm Male x 15mm Female, 2 each
02187	22mm Female x 22mm Male x 15mm Female, 2 each
06765	Pressure Regulator assy 0 - 60 PSIG (0 - 4.2 kg/cm ²)
07525	Oxygen Sampling Hose
09220	Bird Flowmeter 0 - 15 LPM
The following parts can be order separately or as a kit (P/N 10289)	
03849	Bird Spanner Wrench
03389	Transducer Test Harness
15205	Fiber Optic Test Loop
15137	Current Measuring Test Fixture
10269	Transducer Tee Test Harness
10288	Main Sealing Plate
10284	Patient Outlet Sealing Block
10285	Safety Valve Sealing Block
10286	Relief Valve Sealing Block
10287	Regulator Sealing Plate

4.3.3 Special items required for the testing and calibration which are not available from Bird Products Corporation:

Digital Multimeter
Oxygen Regulator (Two Stage Adjustable 0 - 80 PSIG 0 - 5.6 kg cm ²)
Air Regulator (Two Stage Adjustable 0 - 80 PSIG 0 - 5.6 kg/cm ²)
Calibrated Oxygen Analyzer (analyzer should read in tenths to ensure accuracy of calibration)
Precision Pressure Manometer 0 - 30 PSIG (with accuracy of +.05 and -.2 PSIG increments) (0 - 2.1 kg/cm ²)
Flow Tube 0 - 1 LPM (in increments of .1 LPM)



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4.3.3 Continued

Digital Thermometer 50° / 120°F (9° / 48°C)±2°F (-15°C)
with two temperature probes

Digital Pressure Transducer -20 / +140 cmH₂O with accuracy of
+.5 at 0 cmH₂O to +2 cmH₂O at full scale

Variable Transformer 1 - 140 volts or 1 - 260 volts

12 - 16 VDC Power Supply with 5 AMP minimum

4 Function Calculator (must have square root/memory)

Anti-Static Mats for Table and Floor, wrist strap, Anti-Static D.I.P.
Remover for (EPROMS and IC'S) Anti-Static Bags

8 Liter Volume Spirometer ±2% accuracy (or its equivalent)

4.4 V.I.P. BIRD 15,000 HOUR MAINTENANCE KIT P/N 10367 or P/N 10368

P/N	Description	Qty
00114	O-Ring	9
06194	Gasket	1
00138	O-Ring	5
01943	O-Ring	1
30002	O-Ring	1
30003	O-Ring	1
02013	O-Ring	1
30004	O-Ring	1
03373	O-Ring	1
03021	O-Ring	1
03374	O-Ring	2
09788X	Tube	2 ft.
03375	O-Ring	4
06146	Filter	1
33566	Regulator	1
08881	Flapper	1
20175	Insulator	1
10003	Blender Overhaul	1
15005	Flow Valve	1
15029	Exhalation Valve	1
00193	O-Ring	1
03808	O-Ring	2
06435	O-Ring	1

P/N	Description	Qty
07849	O-Ring	1
00109	Washer	1
09754	Safety Valve	1
05532	Female Retainer	1
05531	Male Retainer	1
30006	O-Ring	1
10091	Tube Assy., Prox	1
10099	Tube Assy., Muffler	1
04029X	Tubing, 1/8 Silicone	2 ft.
09603	Elbow Silicone	1
08934	Tube Assy., Reg. Exh.	1
30001	O-Ring	1
80009/81	Overlay, Front Panel	1

4.5 DISASSEMBLY

Introduction

The V.I.P. BIRD Ventilator has been designed to provide the maximum amount of utilization with a minimum of maintenance. The V.I.P. BIRD Ventilator should be serviced only by Bird Products Corporation trained, Hospital/Dealer Service Technicians.

Before servicing or calibrating, the technician must be familiar with the design, operation, warnings, cautions, and notes as explained in Section 1.0 and Section 2.0 of this manual.

A numbering system is utilized so that one can easily identify the steps involved with each operation.

If during Assembly and Operational Verification Procedure a suggested parameter is not met, refer to "Troubleshooting" before proceeding with the next step.

CAUTION ✓

The work area must be Electro Static Discharge (E.S.D.) protected. The technician's work surface must be grounded before removing the top cover and while working on ventilator. All printed circuit board assemblies (PCB) in the V.I.P. BIRD have integrated circuits (IC) and can be severely damaged by static electricity. All PCB assemblies must be placed in anti-static bags after removal.

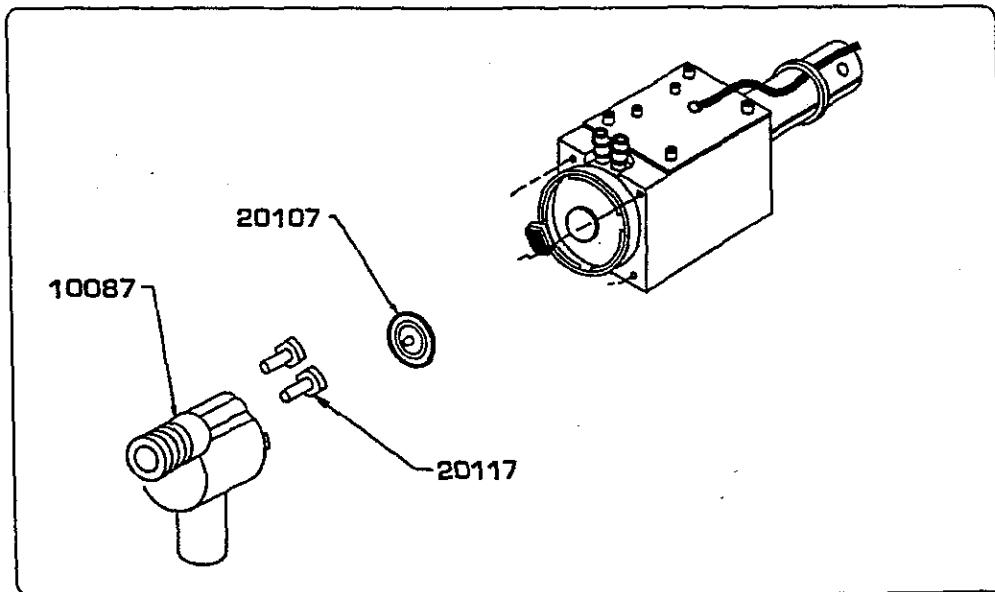
CAUTIONS ✓

- ✓ Always remove exhalation valve body prior to beginning disassembly.
- ✓ Always unplug power cord from electrical power source, wall plug, before removing top cover.

4.5.1 Exhalation Valve Body

4.5.1.1 Push locking tab in and remove Exhalation Valve Body Assembly (P/N 10188).

4.5.1.2 Remove Diaphragm (P/N 20107).

Figure 4.5.1**4.5.2 Ventilator Mounting Bracket**

4.5.2.1 Remove ventilator from mounting bracket by removing the two (2) securing screws (P/N 03275).

NOTE ↗

Before setting ventilator on the work bench, remove the two (2) alignment pins (P/N 04825).

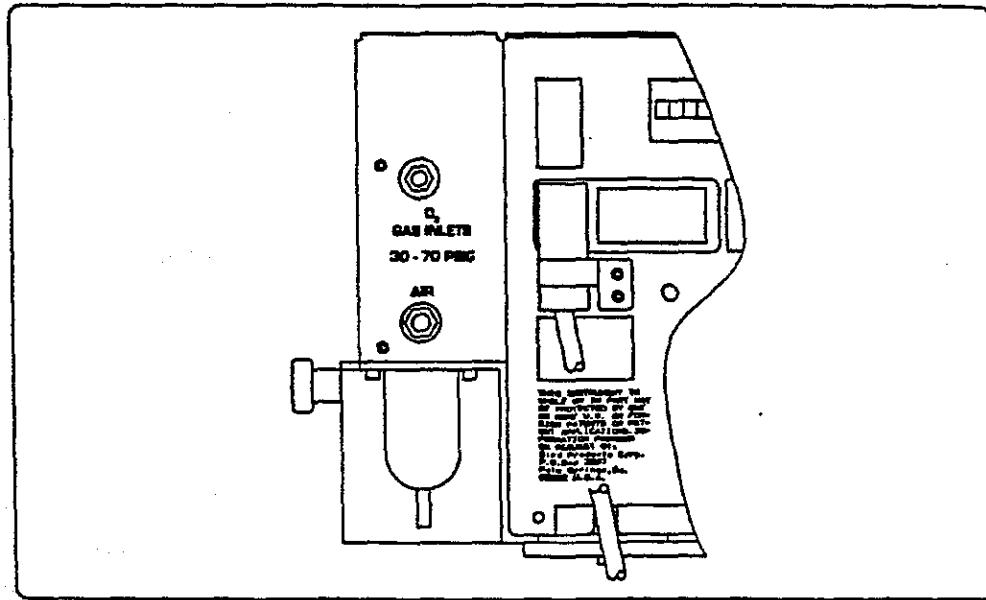
4.5.3 Power Cord And Bracket Assembly

4.5.3.1 Remove the two (2) screws securing the power cord clamp (P/N 06148) using a $9/64$ " Allen driver. This is located left side of the rear panel below the power entry module.

4.5 Disassembly

4.5.3.2 Remove power cord (P/N 08925) from power entry module (P/N 15085).

Figure 4.5.3

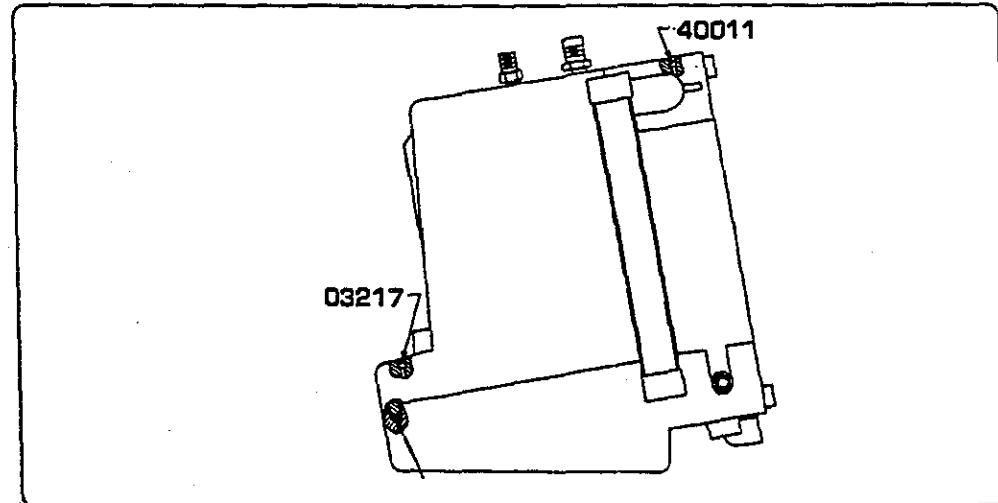


4.5.4 Top Cover Assembly, P/N 20122

4.5.4.1 Carefully lay ventilator on its front panel, exposing the sealing plate.

4.5.4.2 Using a $9/64$ " Allen driver, remove the four (4) screws securing the top cover. Two (2) screws (P/N 03217) are the longer screws and secure the upper part of the top cover. Two (2) screws (P/N 40011) are the shorter screws and secure the lower part of the top cover.

Figure 4.5.4



4.5.4.3 Carefully slide top cover (P/N 20122) up and away from the ventilator.

4.5.5 Front Panel Assembly

- 4.5.5.1 Set unit back in the upright position so that the front is facing away from you.
- 4.5.5.2 Unplug 26 pin ribbon cable from J2 on Main P.C.B.A.
- 4.5.5.3 Unplug 10 pin Molex connection from J3 on Main P.C.B.A.
- 4.5.5.4 Remove tube #0 from manometer barb connector by pulling firmly on tube.

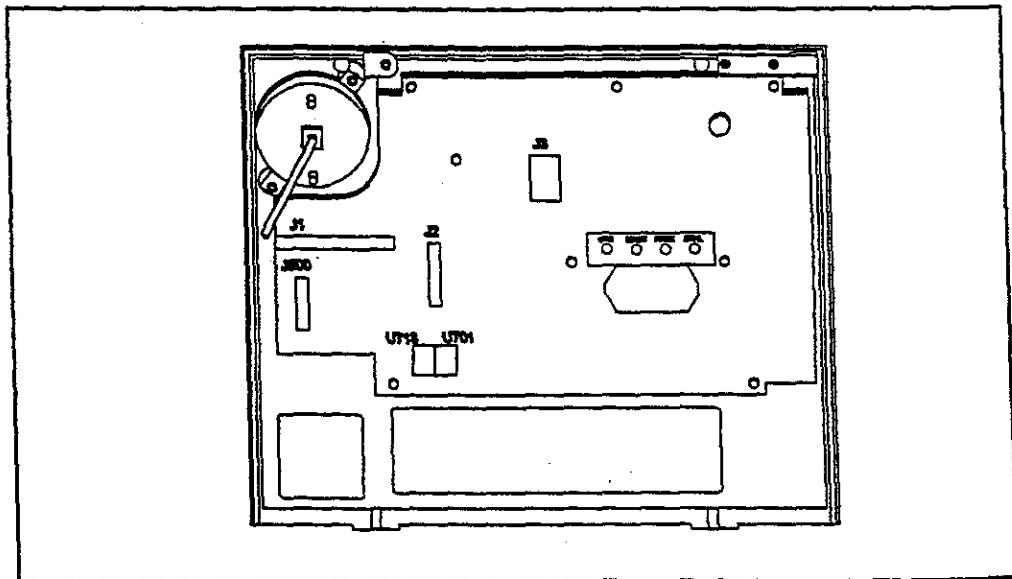
CAUTION

To avoid damaging the four (4) transducers on the Main P.C.B.A., extreme care should be taken when removing the tube assemblies. The proper method for removing these tube assemblies is to pull firmly straight back avoiding applying side load to the transducers.

- 4.5.5.5 Remove the following tubes from the Main P.C.B.A.
- 4.5.5.6 Remove the four (4) tube assemblies from the Main P.C.B.A. marked #8 Gas, #7 Mach, #3 Prox, #6 Exhl.
- 4.5.5.7 Disconnect the fiber optic link cables from the Main P.C.B.A. at U713 and U701.

NOTE

If your unit has an Auto Zero Manifold, then you will not need to disconnect tube #3 Prox or #6 Exhl from the Main PCBA.

Figure 4.5.5

4.5.6 Auxiliary Outlet Assembly P/N 20221

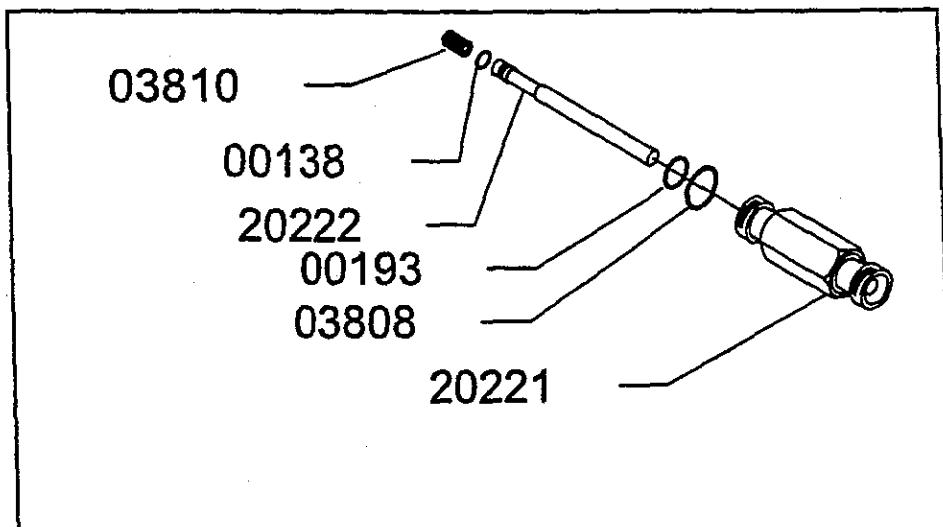
- 4.5.6.1 Using an 11/16" open end wrench, carefully remove auxiliary outlet P/N 03869.
- 4.5.6.2 Using a pair of thin needle nose pliers, carefully remove the poppet spring (P/N 03810) from inside the blender body.
- 4.5.6.3 Remove and discard the two O-rings (P/N 00193, P/N 03808) from the auxiliary outlet assembly (P/N 03809).
- 4.5.6.4 Remove and discard the O-ring (P/N 00138) from the poppet.
- 4.5.6.5 Turn ventilator so that it is facing you.
- 4.5.6.6 Using a 9/64" Allen driver, remove the two screws securing the front panel (P/N 20120).
- 4.5.6.7 Using a 7/64" Allen driver, remove the two bumper feet screws (P/N 40008) secured to the bottom of the front panel (P/N 20120).

NOTE

If the unit has an Auto Zero Manifold, gently pull panel forward while pulling tube #10 and #11 are off of Proximal and Exhalation transducers. Be careful not to put any side load on the transducers.

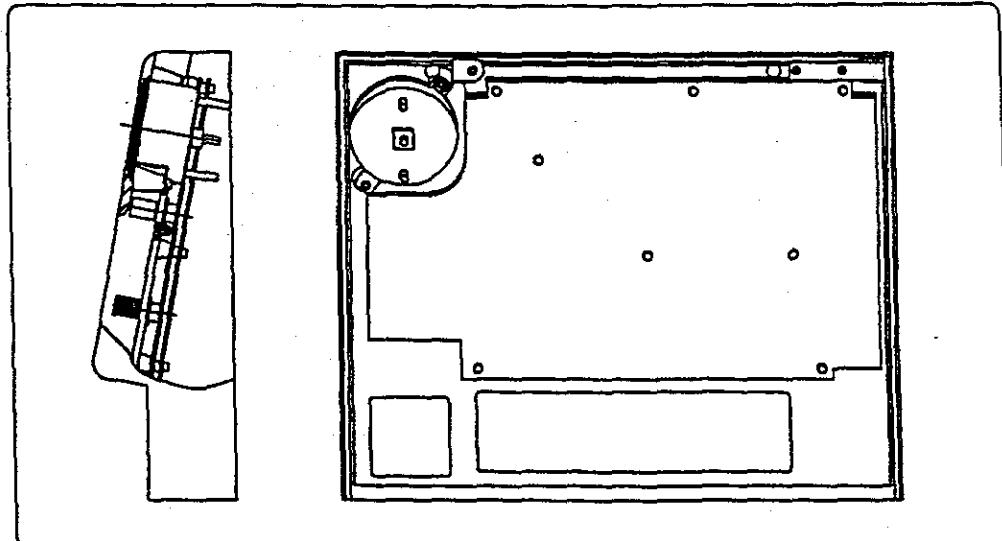
- 4.5.6.8 Slide front panel away from unit and put unit aside.

Figure 4.5.6



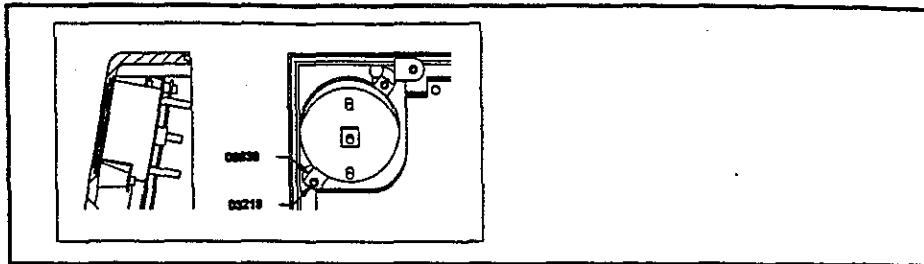
**4.5.7 Display P.C.B.A P/N 50040 or P/N 50250 and
Main P.C.B.A. P/N 50050 or P/N 50260**

- 4.5.7.1** Pull all control knobs (P/N 09798) off the potentiometer shafts.
- 4.5.7.2** From the mode selector switch located at the top left hand side, remove nut using $5/16$ " nut driver.
- 4.5.7.3** Using a $5/16$ " nut driver, remove all friction bushing, (P/N 09780) and locking nuts (P/N 03281).
- 4.5.7.4** Turn front panel over and using a $7/64$ " Allen driver remove the eight (8) securing screws (P/N 03219).
- 4.5.7.5** Remove Display and Main P.C.B.A. from inside front panel housing.
- 4.5.7.6** Place Display P.C.B.A. into anti-static bag.

Figure 4.5.7**4.5.8 Manometer Assembly P/N 09799**

- 4.5.8.1** Remove manometer from inside front panel.
- 4.5.8.2** Using a $7/64$ " Allen driver, remove two (2) securing screws (P/N 03219) along with two (2) securing brackets (P/N 09639).

Figure 4.5.8



4.5.9 Power Board P.C.B.A. P/N 50070 or P/N 50160 (see Fig. 4.7.28 on page 4-84 for 50160 diagram)

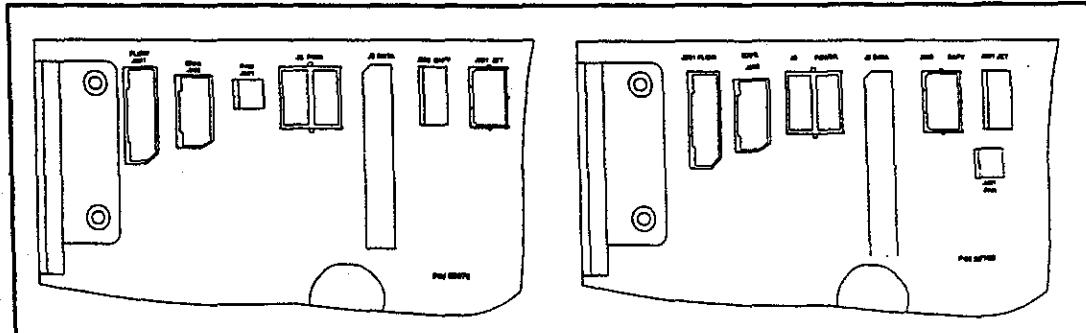
- 4.5.9.1 Disconnect flow control valve 14 pin connector at J201 on Power Board.
- 4.5.9.2 Disconnect exhalation control valve 12 pin connector at J202 on Power Board.
- 4.5.9.3 Disconnect power 10 pin molex connector at J3 on Power Board.
- 4.5.9.4 Disconnect data 26 pin ribbon cable at J2 on Power Board.
- 4.5.9.5 Disconnect jet pump 5 pin connector at J301 on Power Board.

NOTE

If the unit has an auto zero manifold the J301 connector is a two part connector. The Jet Pump is a two pin connector (blue) and goes to the upper two pins on the J301 plug on the Power Supply PCB. Auto Zero Manifold three pin connector (red) goes to the lower three pins on the J301 plug on the Power Supply PCB.

- 4.5.9.6 Disconnect safety solenoid 2 pin connector at J303 on Power Board.
- 4.5.9.7 Disconnect 8 pin molex connector at J8 on Power Board.
- 4.5.9.8 Disconnect transformer 3 pin molex connector at J9 on Power Board.

Figure 4.5.9



**4.5.9 Power Board
P.C.B.A. P/N 50070
Continued**

4.5.9.9 Using $9/64$ " Allen driver, loosen the three (3) securing screws (P/N 08833) on the base of the Power Board. **DO NOT REMOVE SCREWS AT THIS TIME.**

4.5.9.10 Using $7/64$ " Allen driver, remove securing screw (P/N 03219) washer (P/N 04383) from rear panel assembly securing rear panel to Power Board Bracket.

4.5.9.11 Remove Power Board assembly and place in anti-static bag.

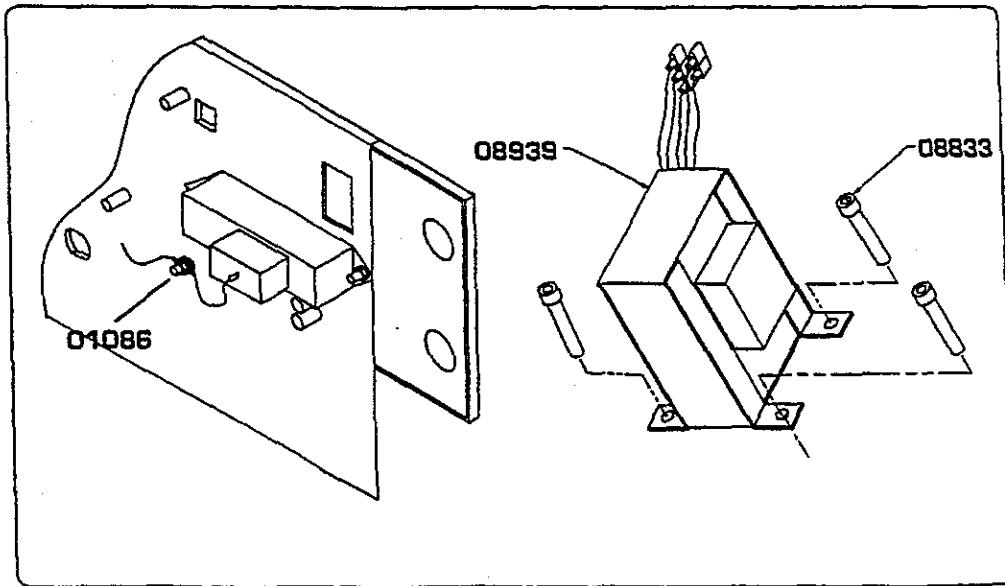
4.5.9.12 Remove the three (3) securing screws (P/N 08833) from the casting where Power Board was secured.

4.5.10 Power Transformer P/N 15114

4.5.10.1 Remove primary wire terminals from Power entry module (P/N 15085) located at the right side inside the rear panel assembly.

4.5.10.2 Using a $7/64$ " Allen driver, remove two (2) securing screws (P/N 03219) from the left hand side outside of the rear panel next to the air and oxygen DISS fittings.

4.5.10.3 Using $7/16$ " open end wrench or $7/16$ " deep socket driver, remove nut (P/N 01066) securing the green ground wire terminal from ground lug located below Power entry module at inside of rear panel.

Figure 4.5.10

4.5.10.4 Using a $9/64$ " Allen driver, remove the four (4) securing screws (P/N 08833) from mounting pad on main accumulator, and remove the Power Transformer (P/N 15038).

4.5.11 Rear Panel Assembly P/N 15004

4.5.11.1 Unscrew two (2) fiber optic cables (P/N 15016 and 15126) from left side of inside of rear panel below D.C. power entry.

4.5.11.2 Using a $5/8$ " open end wrench, loosen and remove the oxygen hose from the inlet block assembly (P/N 33519) inside the rear panel assembly.

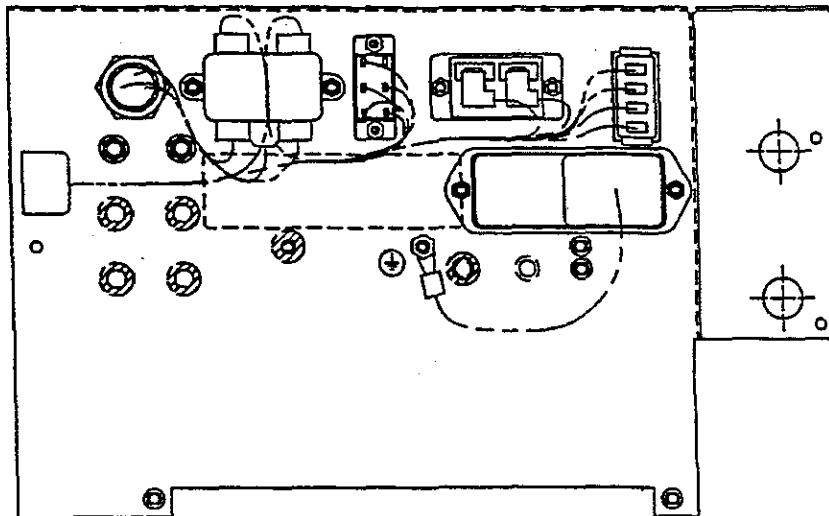
4.5.11.3 Using a $1/4$ " nut driver, loosen the hose clamp (P/N 09787) from the air outlet of the inlet block assembly (P/N 33519) inside the rear panel assembly.

4.5.11.4 Remove the air hose from the connector on the inlet block assembly by pulling firmly on the hose.

NOTE

Pliers may be needed to facilitate the removal of the air hose from the barb fitting on inlet block assembly.

Figure 4.5.11

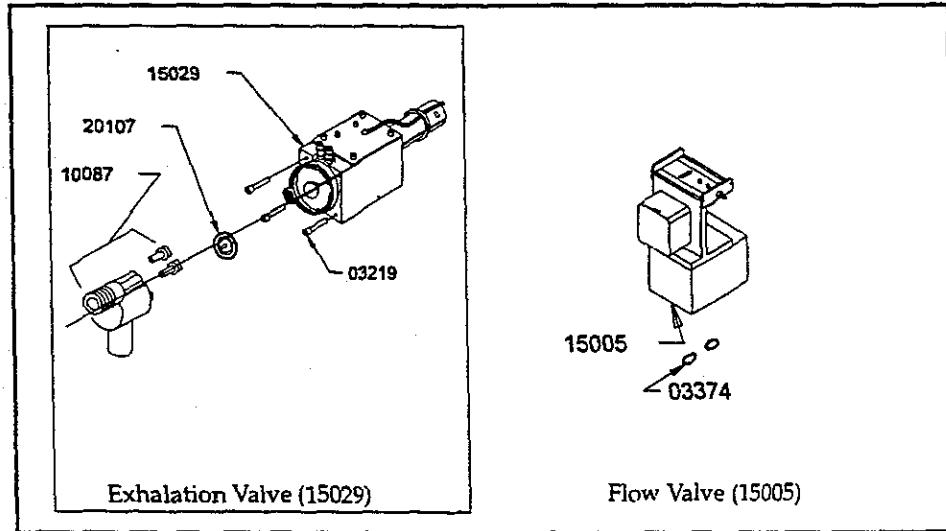


4.5.12 Flow Control Valve Assembly P/N 15005

- 4.5.12.1 Remove if necessary, the plastic harness wraps securing the flow and exhalation valve wire harness assemblies.
- 4.5.12.2 Using a 9/64" Allen driver, remove the two (2) securing screws (P/N 03218) holding the flow control valve to the mounting pad on the casting.
- 4.5.13.3 Remove and discard the two (2) sealing O-rings (P/N 03374) from the counter bored holes in the base of the flow control valve.

4.5.13 Exhalation Valve Assembly P/N 15029

- 4.5.13.1 Remove the two tubes connected to the exhalation valve by pulling firmly in a straight upward motion. Tube numbers are #4 and #7.

Figure 4.5.13

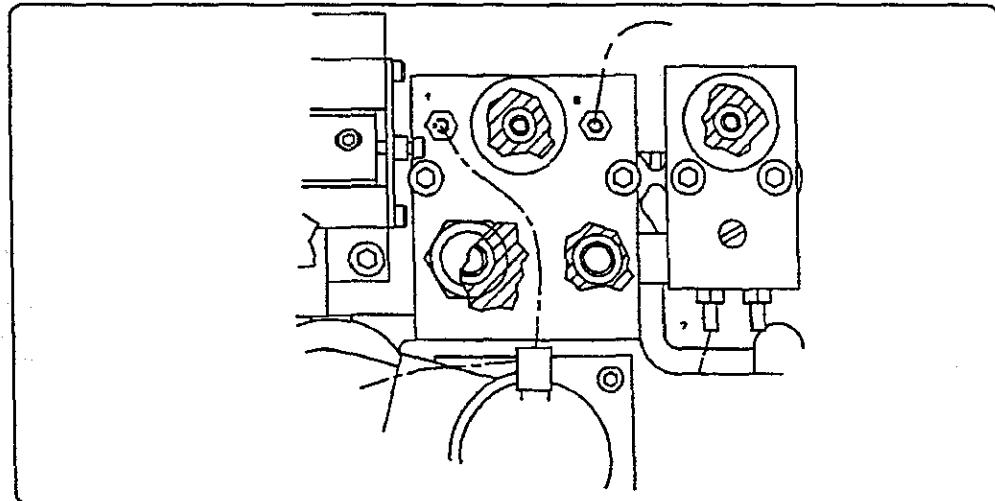
- 4.5.13.2 Using a 7/64" Allen driver, remove the two (2) securing screws (P/N 03219) from the left hand side, outside the front of the casting.
- 4.5.13.3 Remove exhalation valve assembly (P/N 15029) from casting.*
- 4.5.13.3a Remove tube #10 and #11 from the Auto Zero Manifold. Remove number bracelets from tubing before discarding the tubes.
- 4.5.13.3b Using a 3/32" Allen driver, remove the screws on top of the exhalation valve that secure the Auto Zero Manifold.
- 4.5.13.3c Set the Auto Zero Manifold aside to assemble later. Discard the exhalation valve.

* If your unit has an Auto Zero Manifold, do steps 4.5.13.3a - 4.5.13.3c.

4.5.14 Safety Solenoid Assembly P/N 15013

- 4.5.14.1 Remove the two (2) tube assemblies #1 and #9 from the safety solenoid block by pulling firmly in a straight upward motion.
- 4.5.14.2 Using a $\frac{9}{64}$ " Allen driver, remove the two securing screws (P/N 40012) and remove the safety solenoid block assembly from mounting pad on casting.
- 4.5.14.3 Remove and discard all the O-rings from the safety solenoid block assembly. O-rings are:
 - one (1) P/N 01943
 - two (2) P/N 00138
 - one (1) P/N 03375

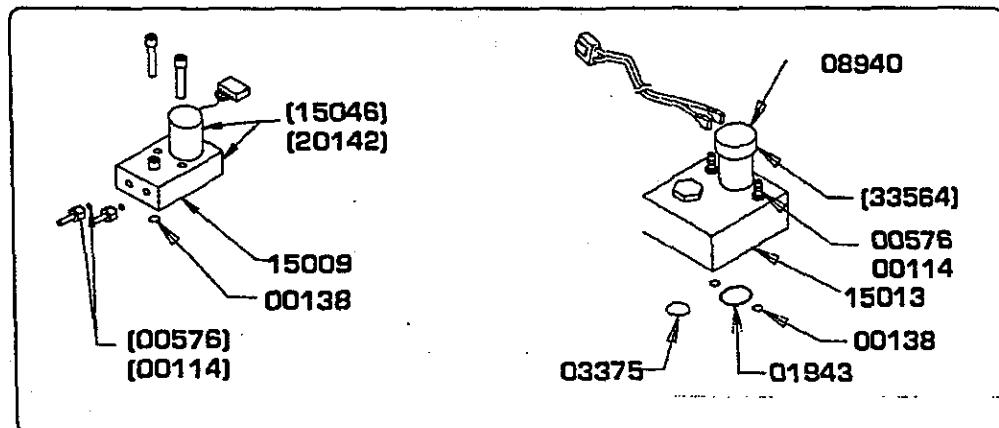
Figure 4.5.14



4.5.15 Jet Pump Assembly P/N 15046

- 4.5.15.1 Remove tube assembly #7 from jet pump assembly by pulling firmly.

Figure 4.5.15



**4.5.15 Jet Pump Assembly
P/N 15046
Continued**

4.5.15.2 Using a $9/64$ " Allen driver, remove the two (2) securing screws (P/N 40015) and remove the jet pump assembly from the mounting pad on the casting.

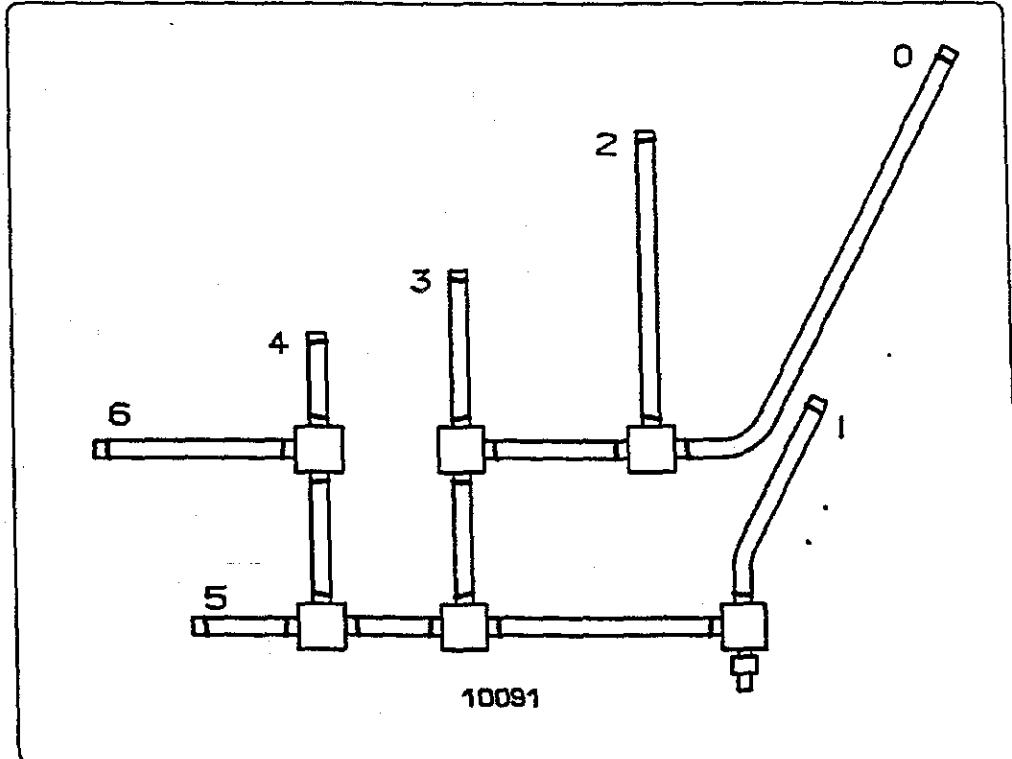
4.5.15.3 Remove and discard O-ring (P/N 00138) from the counter bore hole on the base of jet pump assembly.

4.5.16 Proximal Tube Assembly P/N 10091

4.5.16.1 Turn and pull firmly on tube connector tee fitting from intake of safety valve cap (P/N 00172A) and remove the four (4) remaining tubes from the barbed tube fittings (P/N 00576).

4.5.16.2 Using a $1/4$ " nut driver, remove the two (2) barb fittings (P/N 00576) from the top of the casting base.

4.5.16.3 Remove and discard the O-ring (P/N 00114) from the two (2) barb fittings (P/N 00576).

Figure 4.5.16

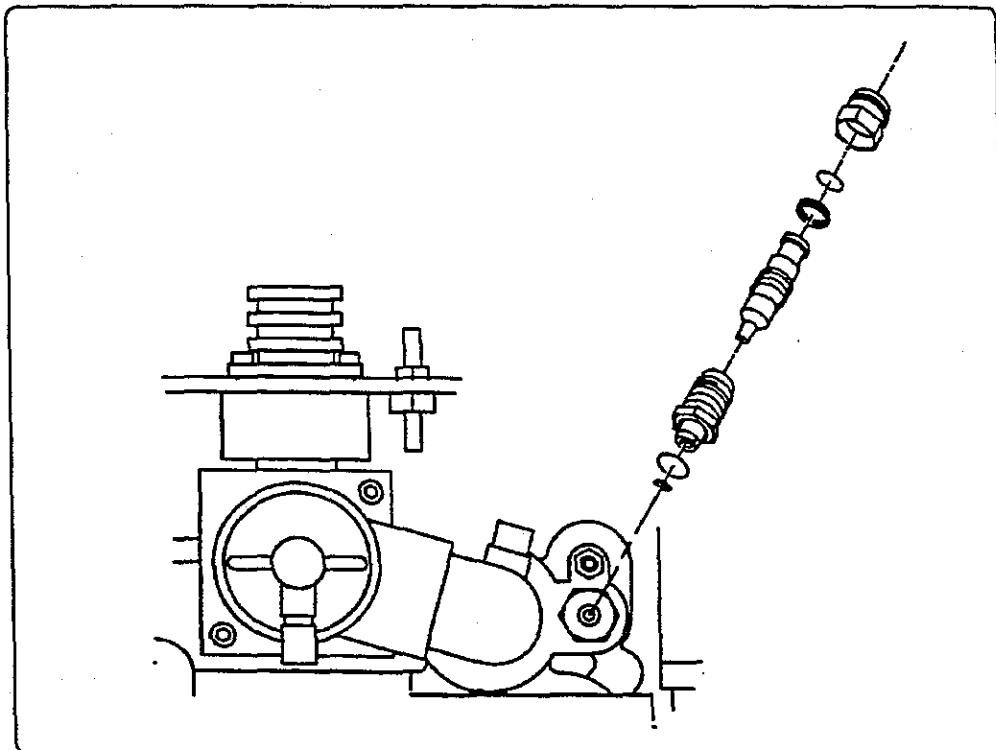
4.5.17 Purge Valve Assembly P/N 10180

4.5.17.1 Using a $1/2"$ open end wrench or a deep socket nut driver, remove purge valve assembly from the top of casting base.

4.5.17.2 Using a $1/2"$ open end wrench and $1/2"$ deep socket nut driver, disassemble the purge valve and discard:

- O-ring (P/N 00138)
- O-ring (P/N 00114)
- O-ring (P/N 07849)
- Nylon Washer (P/N 00109)

Figure 4.5.17



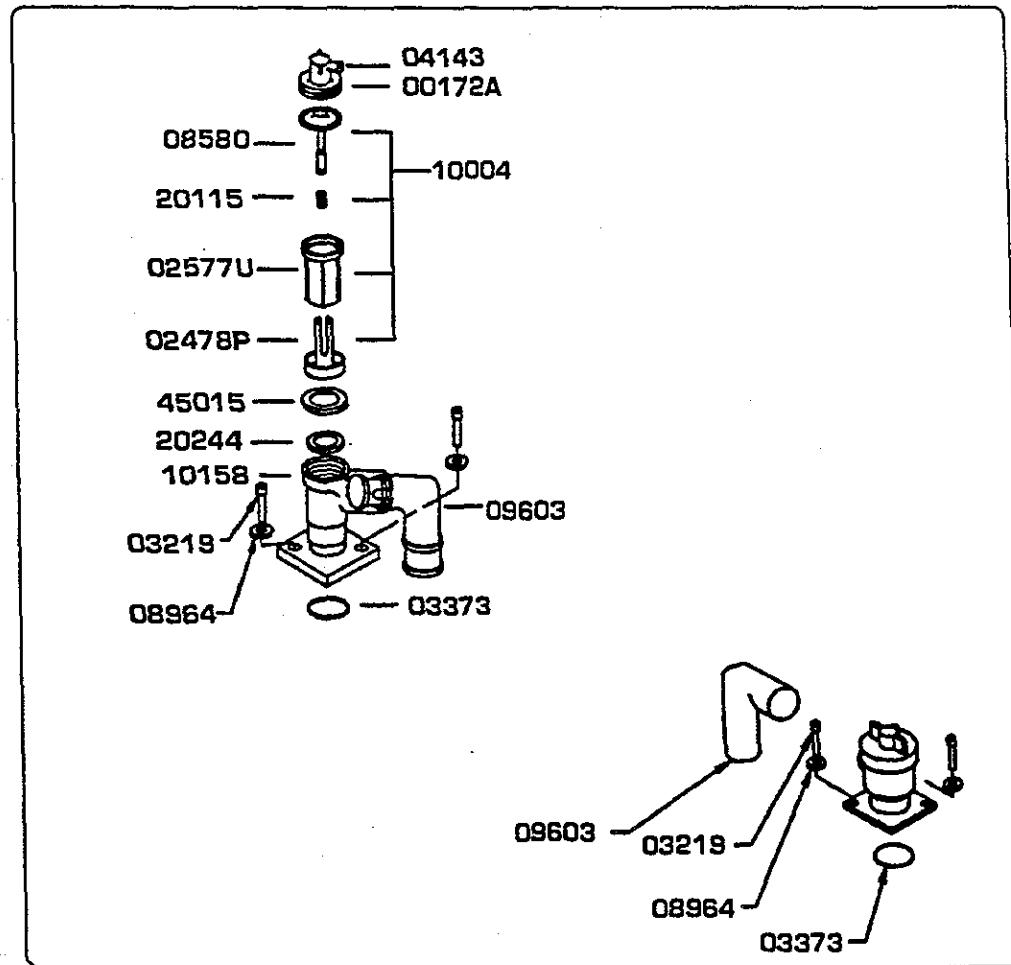
4.5.18 Safety Valve Assembly P/N 09754

4.5.18.1 Remove regulator purge line at regulator (P/N 33566) by pulling firmly on tube. Remove opposite end of purge tube from silicone elbow (P/N 09603) by pulling on elbow connector (P/N 04006).

4.5.18 Safety Valve
Assembly P/N 09754
Continued

- 4.5.18.2 With fingers, pinch silicone tube (P/N 09603) and remove from casting base and from the safety valve assembly.
- 4.5.18.3 Unscrew (counterclockwise) cap (P/N 00172A) from the safety valve assembly.
- 4.5.18.4 Remove cartridge assembly (P/N 10004) from inside the safety valve assembly.
- 4.5.18.5 Using a $7/64$ " Allen driver, remove the two (2) securing screws (P/N 03219) and two (2) washers (P/N 08964) holding the safety valve housing (P/N 10158) to mounting pad on top of the casting base.
- 4.5.18.6 Remove and discard the O-ring (P/N 03373) located inside the counter bore on the base of the safety valve housing.
- 4.5.18.7 Remove and discard the seal (P/N 20244) and washer (P/N 45015) from inside the safety valve housing (P/N 10158).

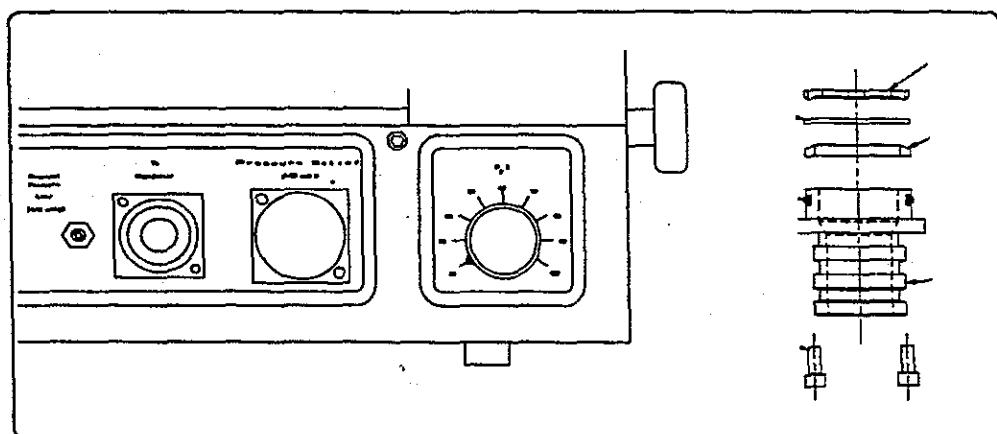
Figure 4.5.18



4.5.19 Patient Outlet Manifold Assembly P/N 10089

- 4.5.19.1 Using a $3/32$ " Allen driver, remove the two (2) securing screws (P/N 40013) and remove the outlet manifold from casting.
- 4.5.19.2 Remove and discard the O-ring (P/N 02013) from sealing groove on the outlet manifold.
- 4.5.19.3 Remove the female retainer (P/N 05532), flapper (P/N 08881), and male retainer (P/N 05531).

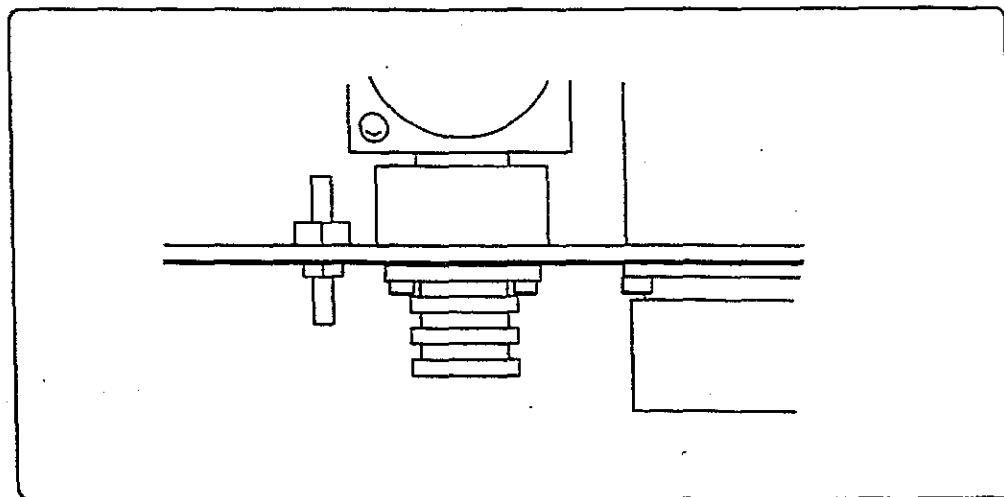
Figure 4.5.19



4.5.20 Proximal pressure Port Fitting P/N 01537

- 4.5.20.1 Using $7/16$ " open end and a $5/16$ " deep socket driver, remove the nut (P/N 01056) from the proximal pressure port fitting (P/N 01537) and remove from the casting base.

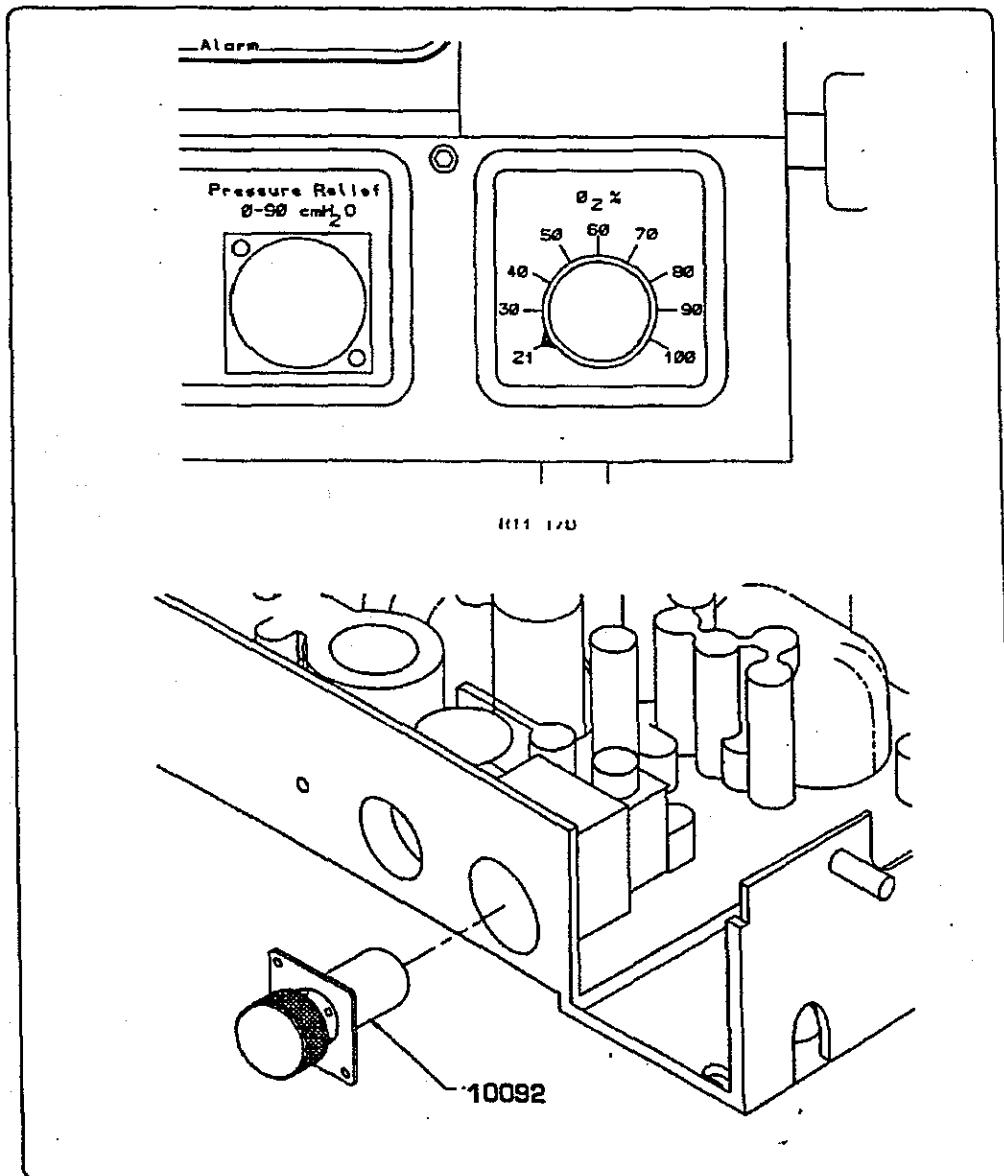
Figure 4.5.20



4.5.21 Pressure Relief Valve P/N 10092

4.5.21.1 Using a $7/64$ " Allen driver, remove the two (2) securing screws (P/N 03219) from the front of the pressure relief valve (P/N 10092).

Figure 4.5.21



4.5.21.2 Pull and twist firmly to remove the pressure relief valve from the casting base.

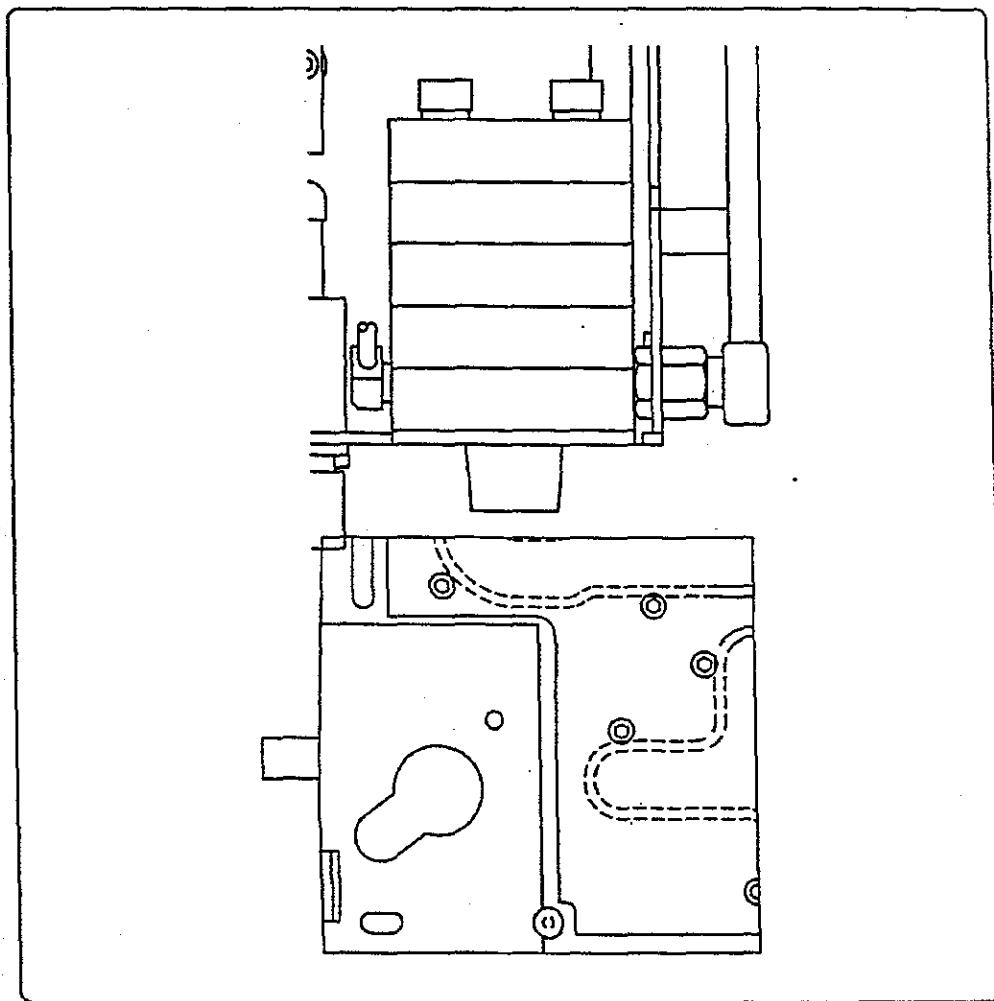
4.5.21.3 Remove and discard the O-rings (P/N 30005 and 30006) from the pressure relief valve body.

4.5.22 Blender Assembly P/N 10160

4.5.22.1 Using a $1/4"$ deep socket, loosen the hose clamp (P/N 09787) at elbow fitting (P/N 33615). Pull firmly on hose and remove from elbow fitting (P/N 33615).

4.5.22.2 Position casting on its back to expose base sealing plate.

Figure 4.5.22



4.5.22.3 Using a $1/8"$ Allen driver, remove two (2) screws (P/N 01432) from casting base securing the blender.

4.5.22.4 Remove the blender and set it aside for further disassembly.

NOTE

Support the blender with your hand to avoid putting stress on the screw or threads.

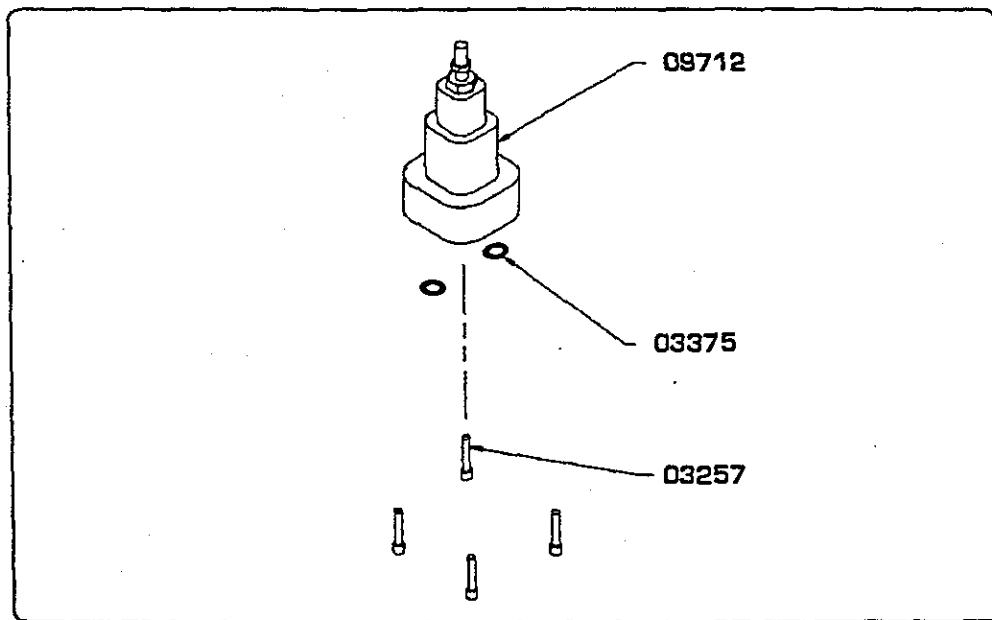
4.5.23 Pressure Regulator P/N 33566

4.5.23.1 Using a $\frac{9}{16}$ " Allen driver, remove four (4) screws securing the regulator to the casting base.

4.5.23.2 Remove and discard the O-rings (P/N 03375) located in the counter bore holes on the base of the regulator.

NOTE

Support the regulator with your hand to avoid putting stress on the screw or threads.

Figure 4.5.23**4.5.24 Inlet Block Assembly P/N 33519**

4.5.24.1 Using a $\frac{7}{16}$ " Allen driver, remove the three (3) screws (P/N 03219) securing the inlet block and coalescing filter bowl to the casting.

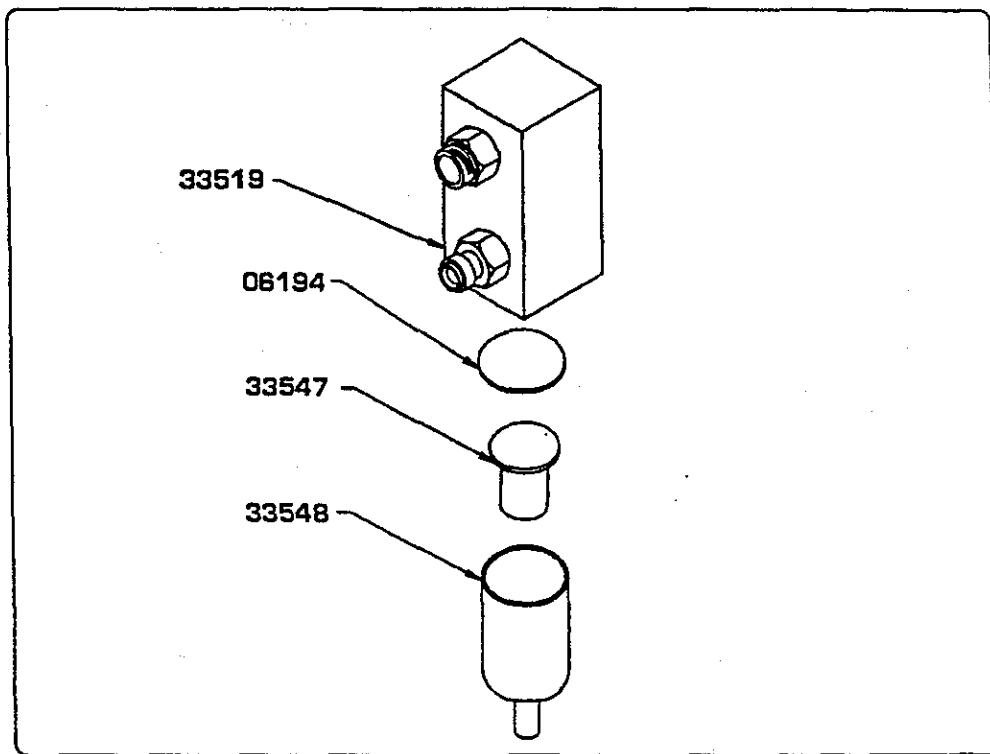
4.5.24.3 Remove filter bowl.

4.5.24.4 Remove and discard coalescing filter (P/N 06146).

4.5.24.5 Remove and discard sealing gasket (P/N 06194).

4.5.24.6 Set inlet block aside for further disassembly later.

Figure 4.5.24

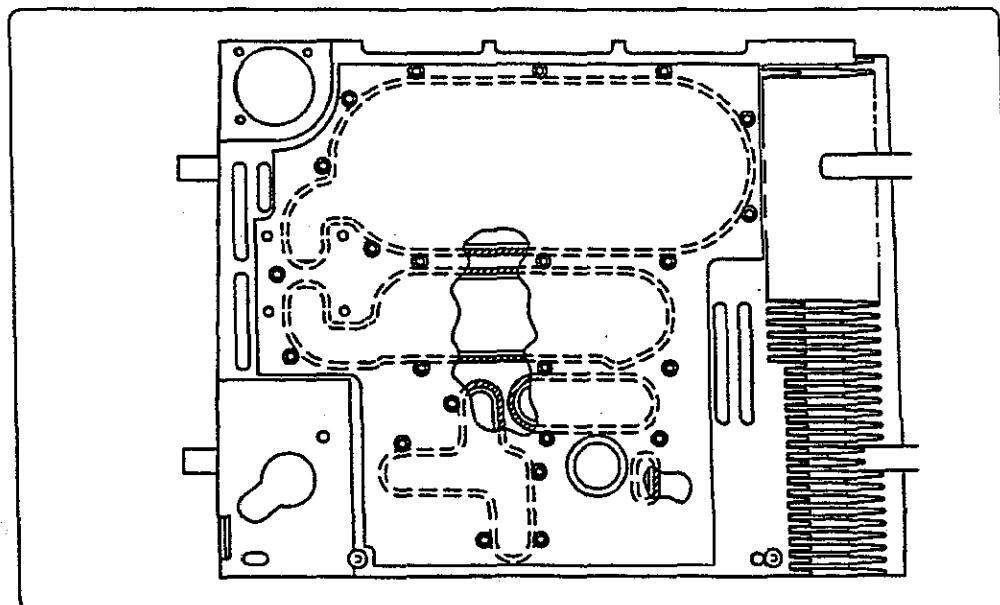


4.5.25 Casting Sealing Plate P/N 20126

4.5.25.1 Position casting exposing the sealing plate. The front of the unit should be facing you.

4.5.25.2 Using a $5/32$ " Allen driver, remove twenty-three (23) screws (P/N 40002) securing the sealing plate to the casting.

Figure 4.5.25



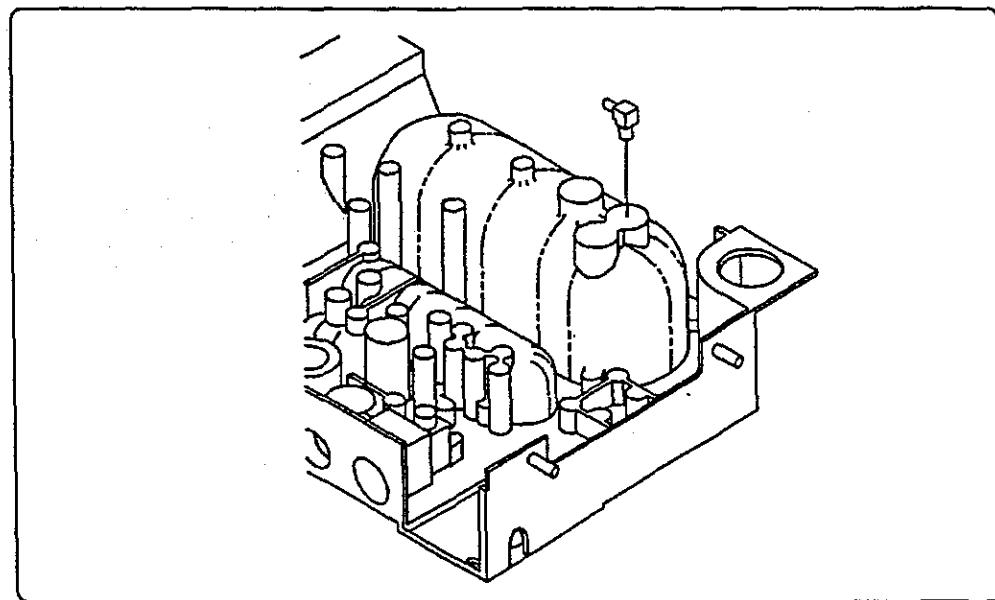
**4.5.25 Casting Sealing
Plate P/N 20126
Continued**

4.5.25.3 Remove the sealing plate (P/N 20126) being careful not to scratch the sealing surface.

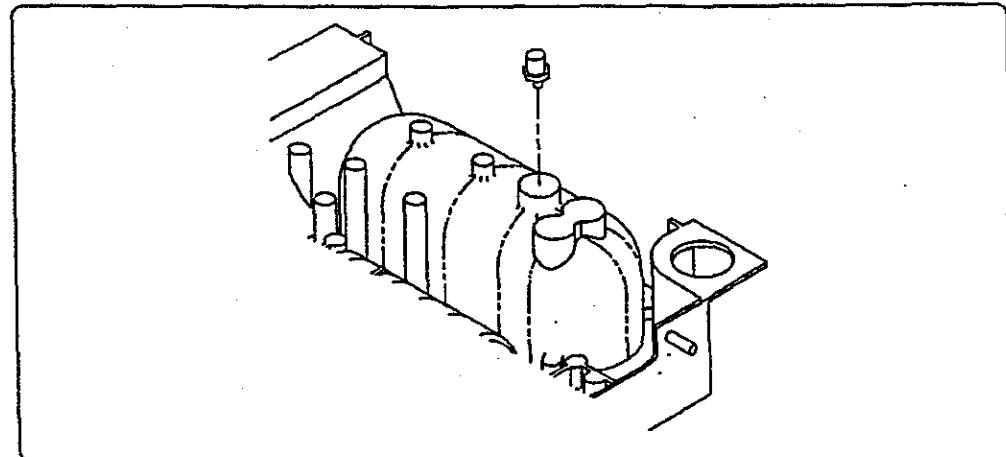
4.5.25.4 Remove the sealing O-rings (P/N 30001), damping chamber (P/N 30002), safety and relief port area (P/N 30004), flow valve port area (P/N 03021), purge valve port area (P/N 30003).

4.5.26 Inlet Elbow P/N 33615

4.5.26.1 Using a $5/8$ " open end wrench, remove the elbow from the top of the main accumulator.

Figure 4.5.26**4.5.27 100 PSI Pressure Relief Valve P/N 09784**

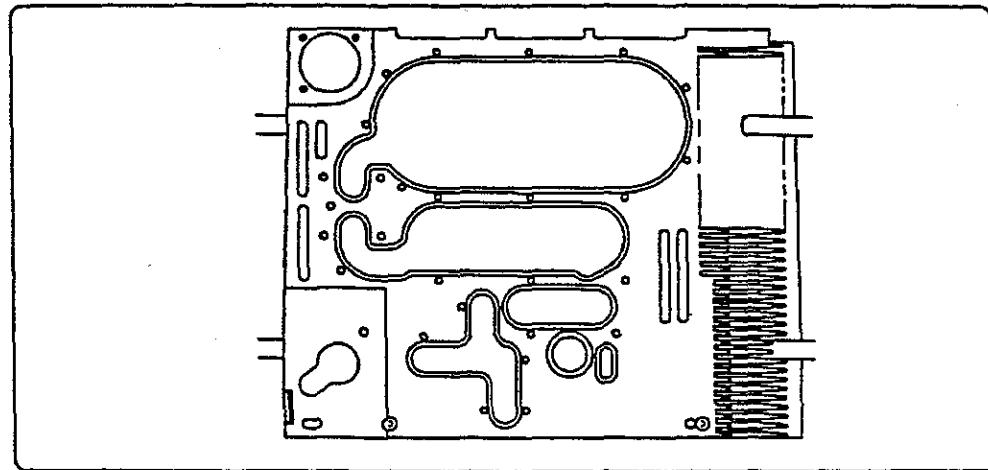
4.5.27.1 Using a $5/8$ " open end wrench, remove the relief valve from the top of the main accumulator.

Figure 4.5.27

4.5.28 Cleaning Casting Base P/N 20125

- 4.5.28.1 Cleaning base is now ready for cleaning. Casting may be scrubbed, using a mild soap and water to remove any debris and traces of lubricant.
- 4.5.28.2 The casting should then be immediately rinsed with distilled or soft water and blown dry using a clean, medical grade compressed air.

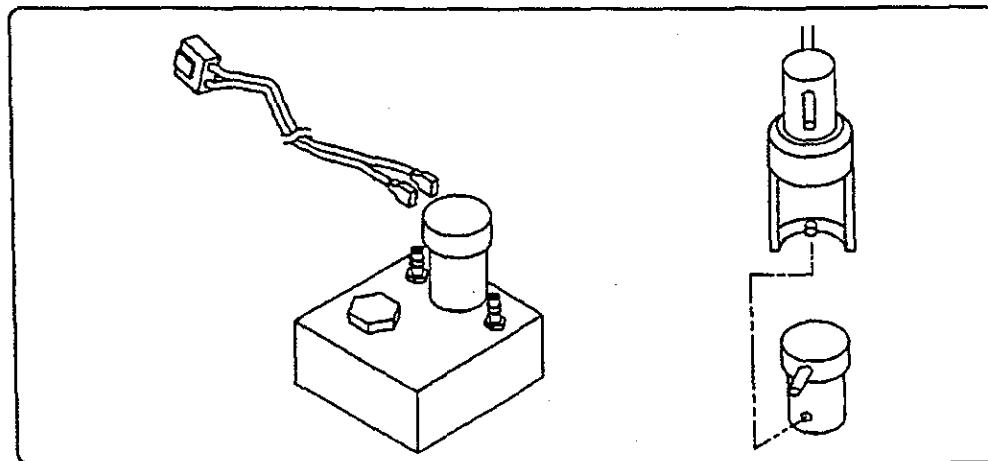
Figure 4.5.28



4.5.29 Safety Solenoid Assembly P/N 15013

- 4.5.29.1 Using a $1/4$ " deep socket driver, remove the two (2) barb connectors (P/N 00576).
- 4.5.29.2 Remove and discard the two (2) O-rings (P/N 00114) from the two barb connectors (P/N 00576).
- 4.5.29.3 Using a $11/16$ " open wrench, remove the plug (P/N 33527) from the solenoid block (P/N 20145).

Figure 4.5.29



- 4.5.29.4 Remove and discard the O-ring (P/N 03808) from the plug (P/N 33527)
- 4.5.29.5 Using a special solenoid wrench (P/N 03426), remove the safety solenoid (P/N 08940) from the solenoid block (P/N 20145). Verify that the o-rings are on the solenoid base. Set solenoid and o-rings aside for later assembly.
- 4.5.29.6 Block (P/N 20145) is now ready for cleaning. The block can be soaked in mild soap and water, or ultrasonic cleaner, or scrubbed by hand.
- 4.5.29.7 Immediately after cleaning, rinse block using distilled or soft water, then blow dry using medical grade compressed air.

4.5.30 Jet Pump Assembly P/N 15009

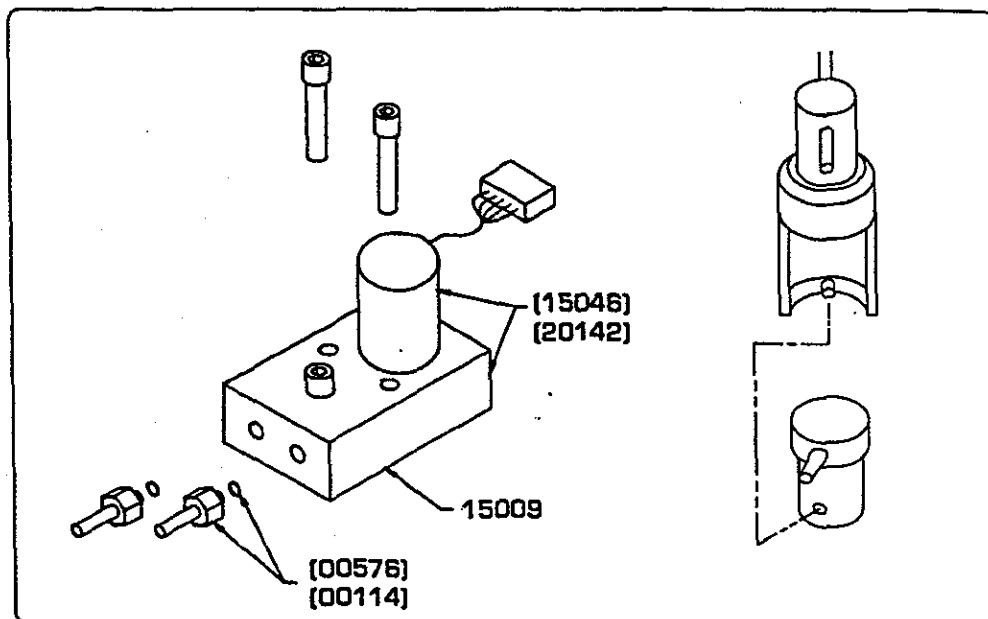
- 4.5.30.1 Using a 5/16" deep socket driver, remove the two (2) barb connectors (P/N 04555) from jet pump block (P/N 20142).
- 4.5.30.2 Remove and discard the two (2) o-rings (P/N 05999) from the two (2) barb connectors (P/N 04555).
- 4.5.30.3 Carefully, using a pair of thin needle nose pliers, remove and discard orifice (P/N 08171) from the right side port in the jet pump block (P/N 20142).
- 4.5.30.4 Using a small flat blade screwdriver remove and discard the o-ring (P/N 00328) from the right side port in the jet pump block (P/N 20142).

NOTE

Some Jet Pump assemblies only have one barbed fitting and no plug.

- 4.5.30.5 Using a standard flat blade screw driver, remove the plug (P/N 01470) from the top of the jet pump block (P/N 20142).
- 4.5.30.6 Remove and discard the o-ring (P/N 00114) from the plug (P/N 01470).
- 4.5.30.7 Using a special solenoid wrench (P/N 03426), remove the solenoid (P/N 15046) from jet pump block (P/N 20142). Verify that the o-rings are on the solenoid base. Set solenoid and o-rings aside for later assembly.
- 4.5.30.8 Jet pump block is now ready for cleaning. Block can be soaked in mild soap and water, or ultrasonic cleaner, or scrubbed by hand.
- 4.5.30.9 Immediately after cleaning, rinse block using distilled or soft water then blow dry using medical grade compressed air.

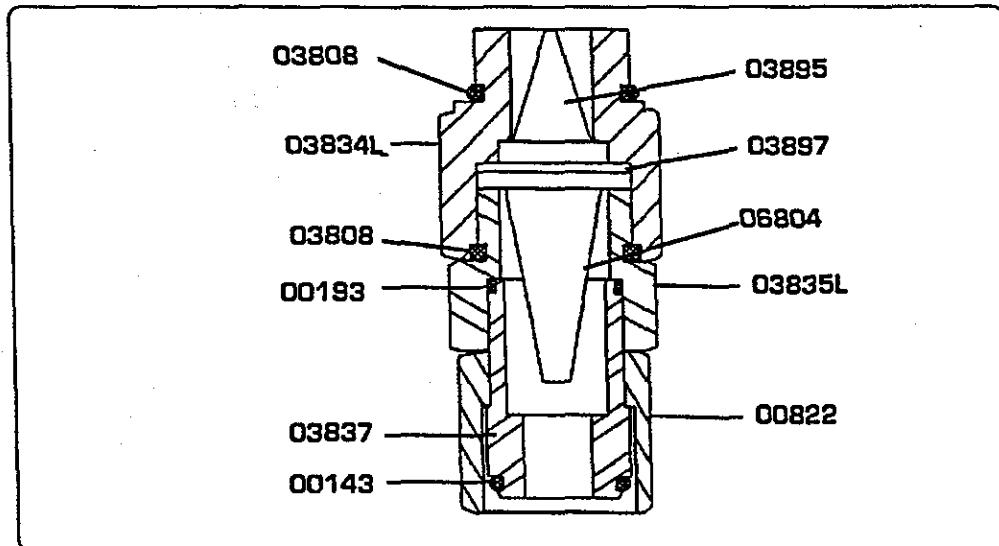
Figure 4.5.30



4.5.31 Oxygen Inlet Assembly P/N 03864L

- 4.5.31.1 Using two (2) $\frac{3}{4}$ " open end wrenches, turn in a clockwise direction (CW) and disassemble the inlet.
- 4.5.31.2 Using a $\frac{3}{4}$ " open end wrenches and a $\frac{1}{8}$ " Allen driver, remove the inlet nipple (P/N 03837) and nut(P/N 00822).
- 4.5.31.3 Remove and discard two (2) O-rings (P/N 03808), one (1) nylon cone filter (P/N 06804), one (1) washer (P/N 03897), one (1) duckbill check valve (P/N 03895) one (1) O-ring (P/N 00143), and one (1) O-ring (P/N 00193).

Figure 4.5.31a

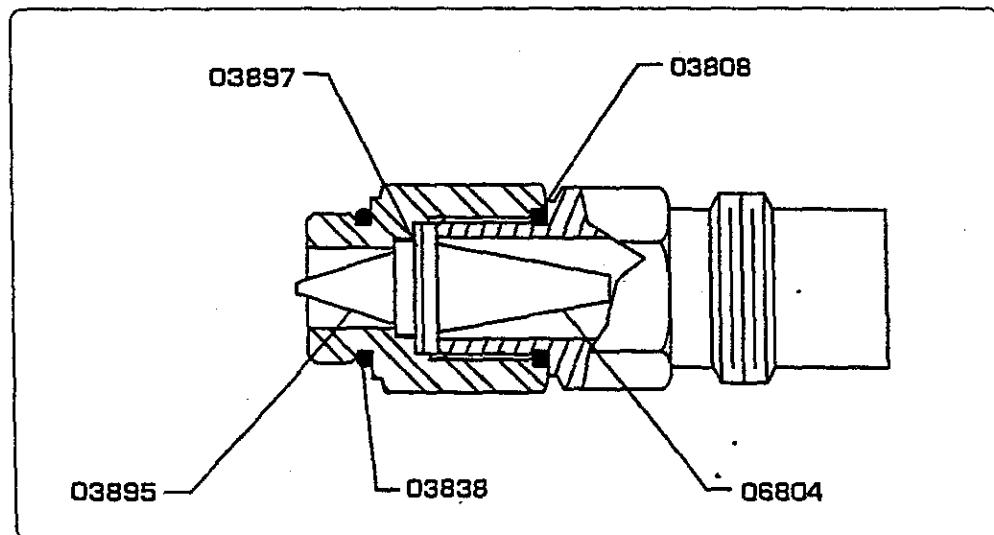


4.5.32 Air Inlet Assembly P/N 10078

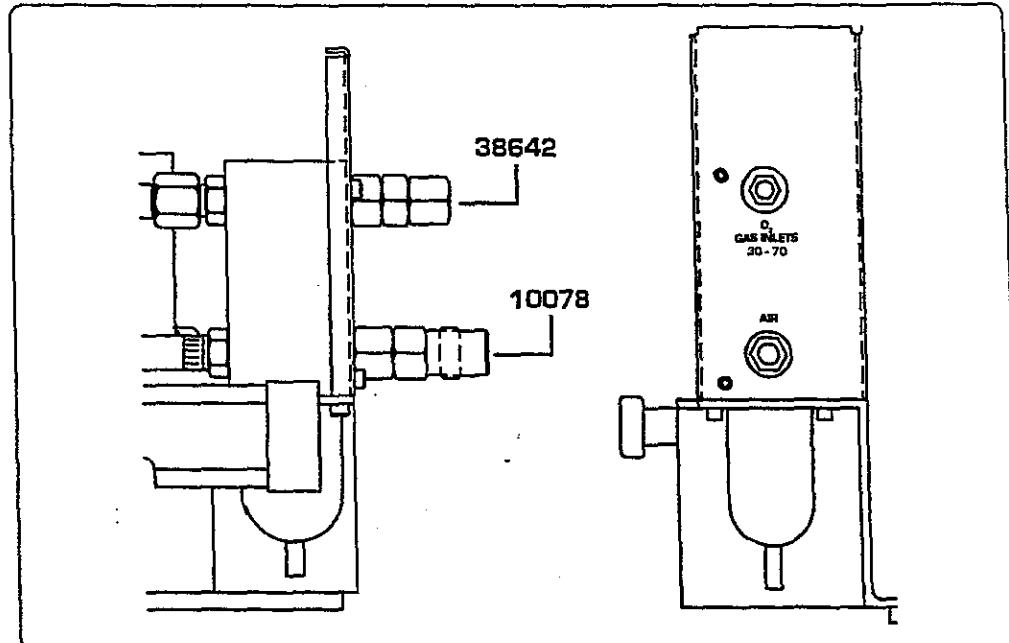
4.5.32.1 Using two (2) $\frac{3}{4}$ " open end wrenches, turn in a counterclockwise direction (CCW) and disassemble the air inlet assembly (P/N 10078).

4.5.32.2 Remove and discard two (2) O-rings (P/N 03808), one (1) nylon cone filter (P/N 06804), one (1) duckbill check valve (P/N 03895) and one (1) washer (P/N 03897).

Figure 4.5.32a



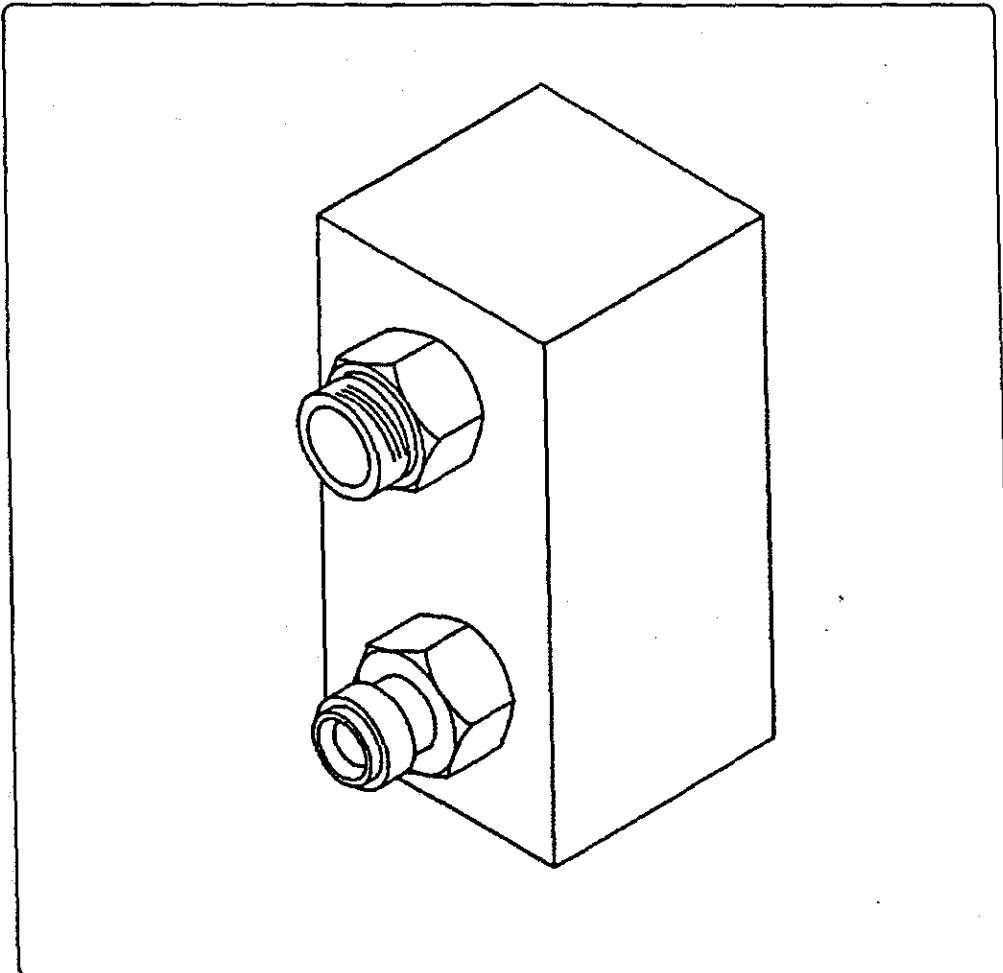
**Figure 4.5.31b &
4.5.32b**



4.5.33 Inlet Block Assembly P/N 33519

- 4.5.33.1 Using a $9/16$ " open end wrench, remove the air outlet port connector (P/N 04859) from the inlet block.
- 4.5.33.2 Using a $5/8$ " open end wrench remove oxygen outlet port (P/N 00610) from the inlet block.
- 4.5.33.3 Block is now ready for cleaning. Block can be soaked in mild soap and water, or ultrasonic cleaner, or scrubbed by hand.
- 4.5.33.4 Immediately after cleaning, rinse the block using distilled or soft water, then blow dry using medical grade compressed air.

Figure 4.5.33





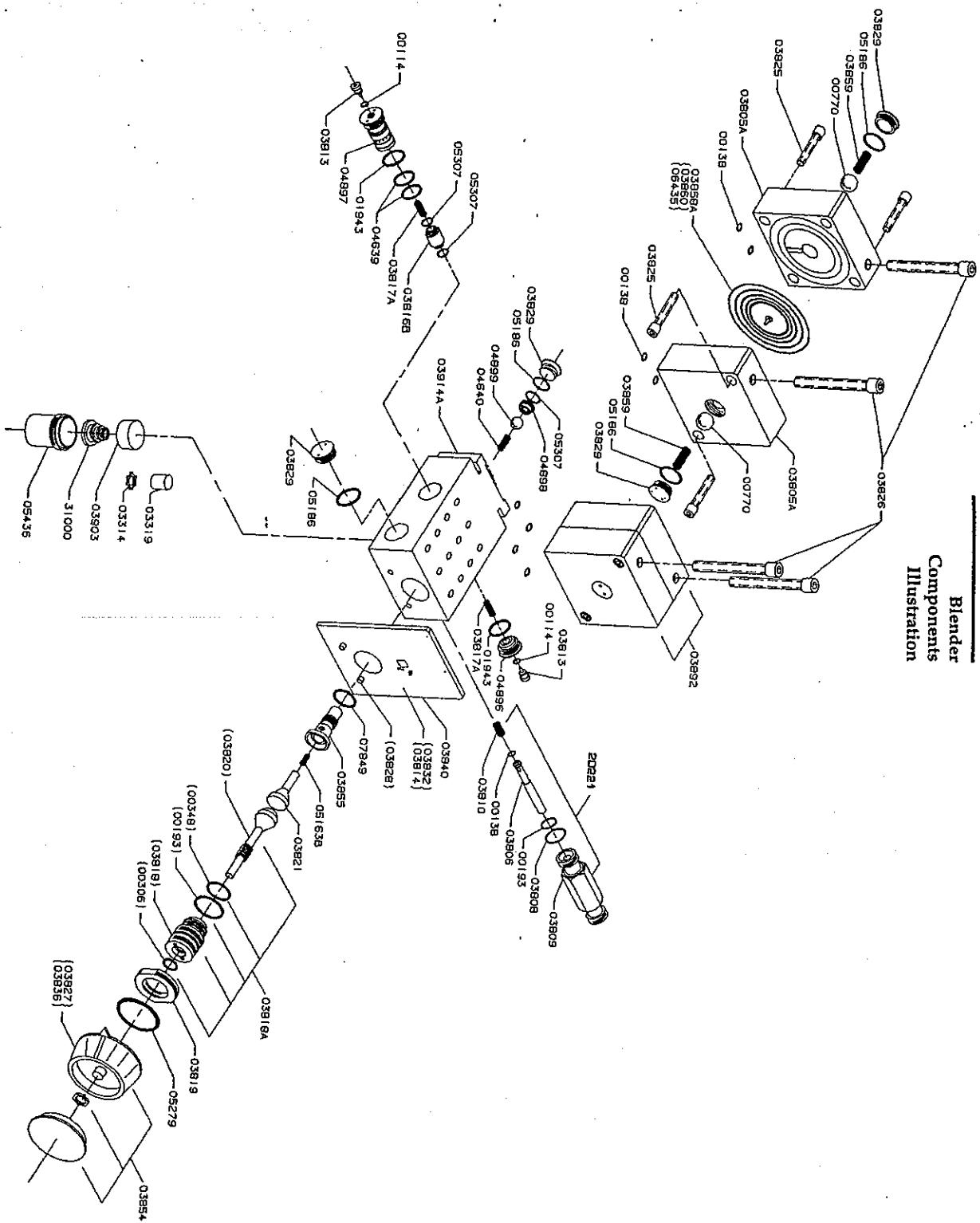
SECTION 4.0: MAINTENANCE AND SERVICE

4.6

BLENDER MAINTENANCE AND CALIBRATION

4.6 Blender Maintenance and Calibration

Blender
Components
Illustration

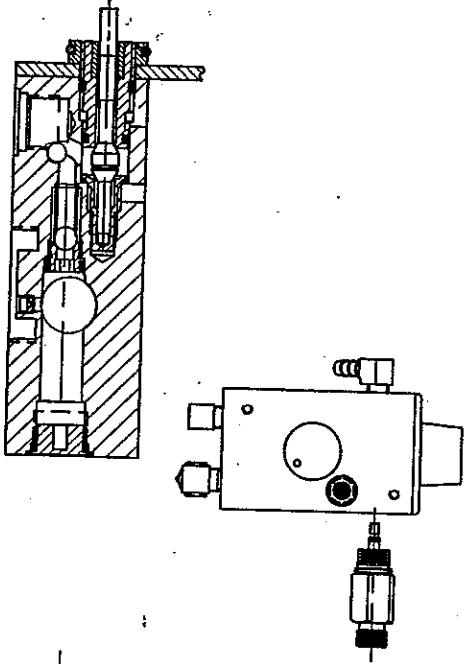


V.I.P.

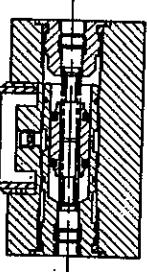
SECTION 4.0: MAINTENANCE AND SERVICE

Blender
Maintenance
Illustration

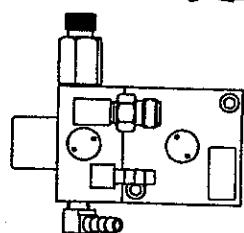
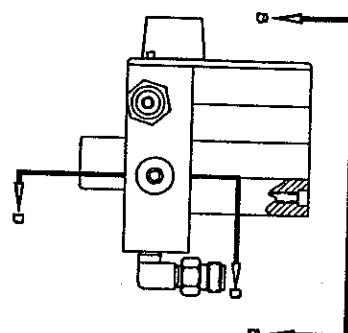
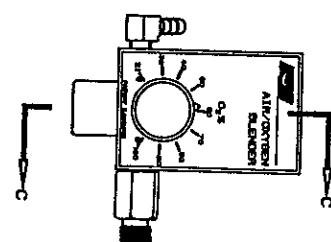
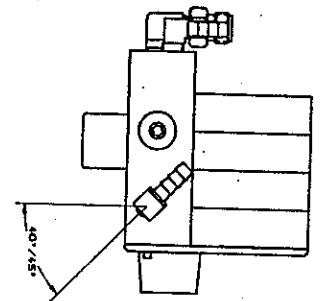
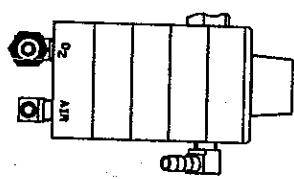
SECTION C-C



SECTION D-D



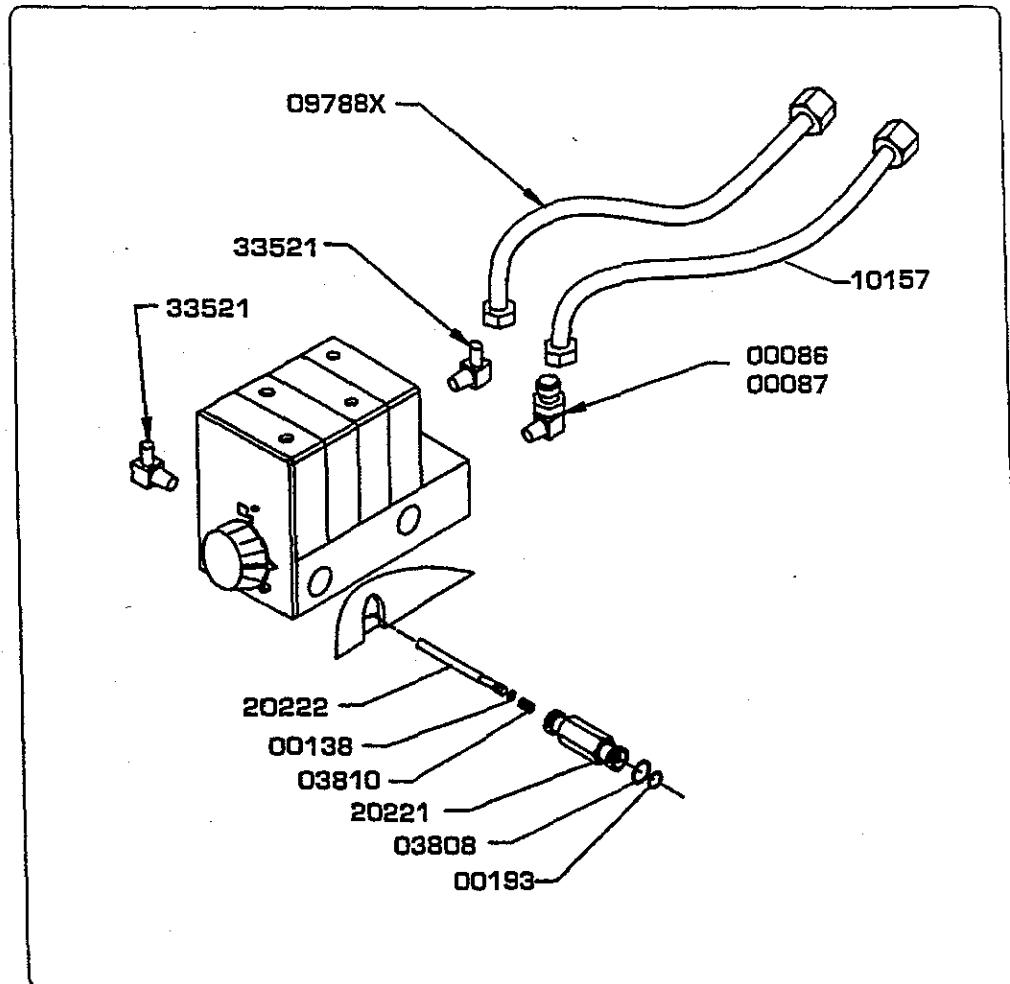
VIEW B-B
VIEW ROTATED 90° CW



4.6.1 Blender Assembly P/N 10160

- 4.6.1.1 Using a $1/4"$ nut driver, loosen three (2) hose clamps (P/N 09787) one from the inlet connectors and one (1) outlet connector (P/N 33521).
- 4.6.1.2 Remove the outlet hose in the manner as the inlet hoses.
- 4.6.1.3 Using a $7/16"$ open end wrench, remove the three (2) 90° elbow connectors (P/N 33521) from the blender assembly (P/N 10160).
- 4.6.1.4 Using a $5/8"$ open end wrench remove oxygen hose (P/N 10197 from the oxygen inlet connector on the blender.
- 4.6.1.5 Using a $7/16"$ open end wrench remove the 90° oxygen connector assembly (P/N 00086, 00087).

Figure 4.6.1





SECTION 4.0: MAINTENANCE AND SERVICE

4.6.2 Balance Block P/N 03805

4.6.2.1 With a $5/32$ " Allen wrench, remove the top four screws (P/N 03826) securing the two balance block assemblies to the valve block (P/N 03870A).

NOTE

The balance block assemblies are identical and interchangeable. For ease of assembly, the blocks may be labeled (A,B,C, and D).

4.6.2.2 Using spanner wrench (P/N 03849), remove the caps (2 each) per balance block assembly. Remove the o-rings (P/N 05186) and discard.

NOTE

Poppet spring (P/N 03859) and ball (P/N 00770) will be loose following the removal of balance block cap. Remove components and set aside.

4.6.2.3 With a $5/32$ " Allen wrench, remove each of (4) screws securing each pair of blocks. Remove the diaphragms (P/N 03858A) and o-rings (P/N 00138) and discard.

4.6.2.4 Clean all parts with an all purpose liquid cleaning solution and rinse with clean, warm water. Ensure all passages are blown completely dry before beginning reassembly. Be sure that the poppet seat areas are perfectly clean.

4.6.2.5 Balance Block assembly suggested replacements parts:

- P/N 03858A (2) Diaphragm
- P/N 05186 (4) O-ring

NOTE

When ordering replacement O-rings, a "D" suffix indicates the O-rings are available in a 10-pack.

4.6.2.6 Holding diaphragm alignment tool (P/N 03850) in hand, place the "A" block onto the alignment tool with the diaphragm cavity facing up.

4.6.2.7 Place diaphragm (P/N 03858A) into cavity.

NOTE

Make sure poppet pin on diaphragm seats into diaphragm alignment tool (P/N 03850).

4.6.2.8 Place "B" block on top of assembly with diaphragm cavity facing down.

NOTE

Align block assemblies for proper gas flow. Three holes on side of each block, top and bottom, must be aligned.

4.6.2.9 Insert second diaphragm alignment tool (P/N 03850) into block "B", making sure the poppet pin on diaphragm seats into alignment tool.

4.6.2.10 Fasten block "A" and "B" together loosely with 2 screws (P/N 03825).

4.6.2.11 Holding the 2 diaphragm alignment tools in place, lay the entire assembly with one of its surfaces on a flat surface. This will align blocks properly for mating with valve block.

NOTE

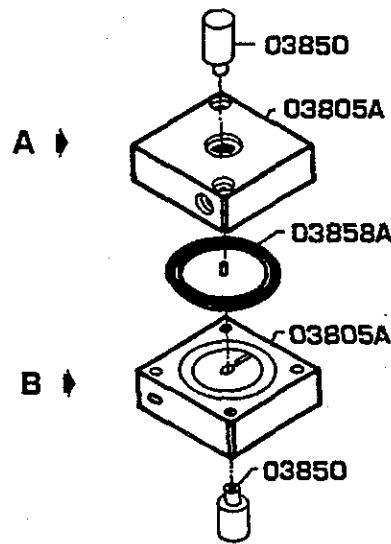
The three holes on the side of each block, top and bottom, must be aligned.

4.6.2.12 Using a $5/32$ " Allen wrench, tighten the previously installed two (2) screws holding blocks "A" and "B" together.

4.6.2.13 Install and tighten, using a $5/32$ " Allen wrench, the remaining two (2) screws to opposite side of "A" and "B" block assembly.

4.6.2.14 Remove both diaphragm alignment tools and place "A" and "B" block assembly on its side.

Figure 4.6.2a

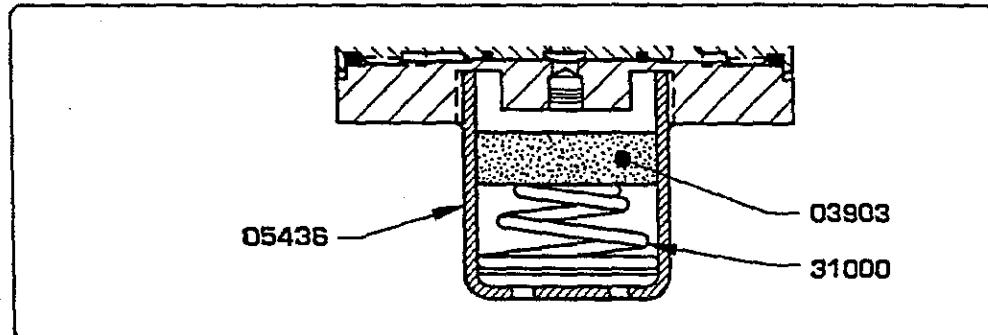


b) Remove diffuser foam and discard.

c) Remove spring.

4.6.3.2 Alarm Cap Reassembly:

Figure 4.6.3



Replacement Parts:

P/N	Qty.	Description
03903	1	Diffuser
05436	1	Alarm Cap

a) Install spring (P/N 31000) with its wide base on top of reed inside alarm cap (P/N 05436)

b) Place diffuser (P/N 03903) into alarm cap above spring.

c) Check alarm assembly for proper audible function

d) Set alarm assembly aside for final assembly

4.6.3.3 Alarm Check Valve Disassembly/Assembly Rear of MicroBlender:

a) With spanner wrench (P/N 03849) remove cap from rear of valve block.

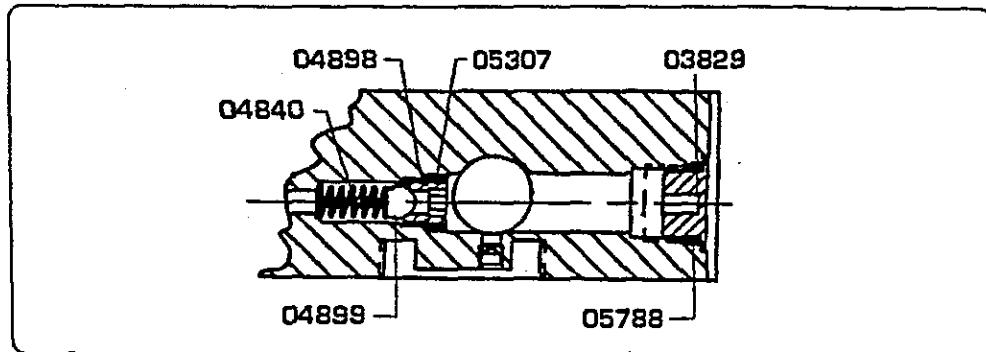
b) Remove and discard O-ring from cap.

c) Using a $5/32$ " Allen wrench, remove checkball retainer, rubber checkball and spring.

d) Remove and discard O-ring and rubber checkball.

4.6.3.4 Alarm Check Valve Reassembly:

Figure 4.6.3.4



Replacement parts:

P/N	Qty.	Description
04898	1	Checkball
05186	1	O-ring
05307	1	O-ring

- Using lubricant (P/N 00631), lubricate o-ring (P/N 05186) and install on cap (P/N 038239).
- Using lubricant (P/N 00631), lubricate o-ring (P/N 05307) and install in groove on checkball retainer (P/N 04898).
- Inspect new rubber checkball (P/N 04899) to ensure that it is spotless clean and not damaged by scratches, nicks, or flat spots. Lubricate lightly with lubricant (P/N 00631).
- Set rubber checkball, checkball retainer assembly, spring (P/N 04640) and cap assembly aside for final assembly.

4.6.4 Auxiliary Outlet Reassembly

Replacement parts:

P/N	Qty.	Description
00138	1	O-ring
03808	1	O-ring
00193	1	O-ring

- a) Install lightly lubricated O-rings (P/Ns 03808 and 00193 on auxiliary outlet and O-ring (P/N 00138) on poppet.
- b) Insert poppet into auxiliary housing.
- c) Set assembly with spring aside for final assembly

4.6.5 Proportioning Module

4.6.5.1 Control Knob/Front and Rear Seat Valve Assembly:

- a) Remove grey cover on control knob with thin-bladed screwdriver or knife.
- b) Using a $9/32$ " nut driver, loosen nut just enough to remove knob from shaft.
- c) With an $11/16$ " open end wrench, remove front seat lockout and O-ring (P/N 05279). Remove front plate (P/N 03840) by gently separating from the block assembly.
- d) Using the Bird Spanner Wrench (P/N 03849), remove the front seat (P/N 03818A) including valve stem (P/N 03820).
- e) Rotate valve stem clockwise to remove from seat.
- f) Shake valve block to facilitate removal of rear valve stem (P/N 03821) and spring (P/N 05163B).
- g) Using a $1/8$ " Allen wrench, remove the rear seat (P/N 03855) and O-ring (P/N 07849) from valve body. Next, remove O-ring from rear seat and discard.

Clean all parts with an all purpose liquid cleaner and rinse with clean warm water. Ensure all passages are blown completely dry before beginning assembly.



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4.6.5.2 Control Knob/Front and Rear Seat Assembly:

P/N	Qty.	Description
00348	1	O-ring
00193	1	O-ring
05279	1	O-ring
00306	1	O-ring
00631	1	Lubricant
07849	1	O-ring

- a) Lightly lubricate O-rings (P/N's 00193, 00348, 00306) with lubricant (P/N 00631) and install on front seat.
- b) Lightly lubricate O-ring (P/N 07849) with lubricant (P/N 00631) and install on rear seat.
- c) Inspect valve seats carefully. They should have a sharp edge void of chamfer, nicks or wear. Replace if necessary.
- d) Carefully hand-tighten front valve stem (P/N 03820) into front seat (P/N 03818) until light contact is made with front seat.

CAUTION ✓

DO NOT OVER TIGHTEN AS VALVE SEAT DAMAGE COULD OCCUR.

- e) Set control knob, cap, front plate, locknut, front seat, rear seat, rear valve spring (P/N 05163B) and O-ring (P/N 05279) aside for final assembly.

4.6.6 Bypass Disassembly

- 4.6.6.1 Using a $1/8$ " Allen wrench, unscrew adjuster (P/N 03813) from each seat. Remove the o-rings (P/N 00114) from each adjuster and discard.

NOTE ↗

A small spring (P/N 03817A) is contained in each assembly. Remove springs prior to disassembly of bypass seats.

4.6.6.2 Using a $7/32$ " allen wrench, unscrew bypass seat (P/N 03815) front valve block. Remove O-ring (P/N 05816) from each seat and discard.

4.6.6.3 Carefully push bypass poppet (P/N 03816B) out through opening in the valve block. Remove o-rings (P/N 05307) from poppet and discard.

NOTE

Use a blunt slender probe to push poppet out of enclosure. Use care to avoid scratching the surface of cylinder in which the poppet operates.

Bypass Assembly Replacement Parts:

P/N	Cty.	Description
03816B	1	Bypass poppet
01943	2	O-ring
05307	2	O-ring
00114	2	O-ring
00631	1	Lubricant
03851	1	Lubricant grease
04639	2	O-ring

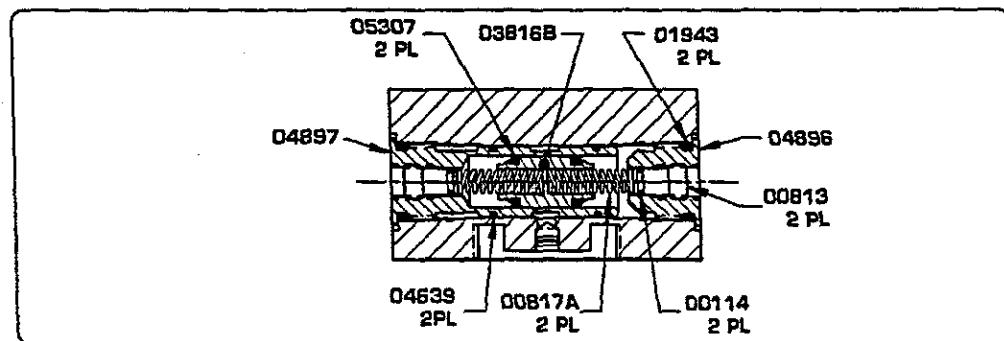
4.6.6.4 Lightly lubricate (2) O-rings (P/N 05186) with lubricant (P/N 00631) and install on bypass seats (P/N 03815).

4.6.6.5 Lightly lubricate (2) O-rings (P/N 00114) with lubricant (P/N 00631) and install on bypass adjusters (P/N 03813).

4.6.6.6 Thoroughly lubricate (2) O-rings (P/N 05307) with lubricant grease (P/N 03851) and assembly to bypass poppet (P/N 03816B).

4.6.6.7 Set bypass seats, adjusters, poppet and springs (2) aside for final assembly.

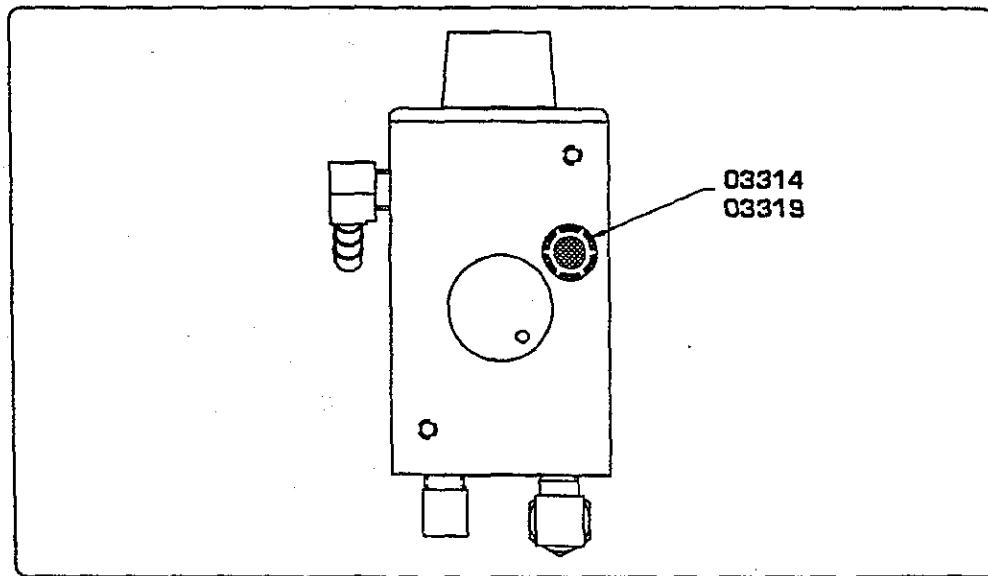
Figure 4.6.6



4.6.7 Muffler Assembly P/N 03319

- 4.6.7.1 With a small screwdriver, carefully lift star retainer (P/N 03314) from bottom of valve block. Discard star retainer (P/N 03314).
- 4.6.7.2 Remove muffler (P/N 03319) carefully with a pointed probe and discard.

Figure 4.6.7



4.6.8 Valve Block

- 4.6.8.1 Clean with all purpose liquid cleaner and rinse with clean, warm water. Ensure all passages are blown completely dry before beginning assembly.

4.6.9 MicroBlender Final Assembly P/N 10160

4.6.9.1 Balance Block:

Replacement parts:

P/N	Qty.	Description
00138	8	O-ring

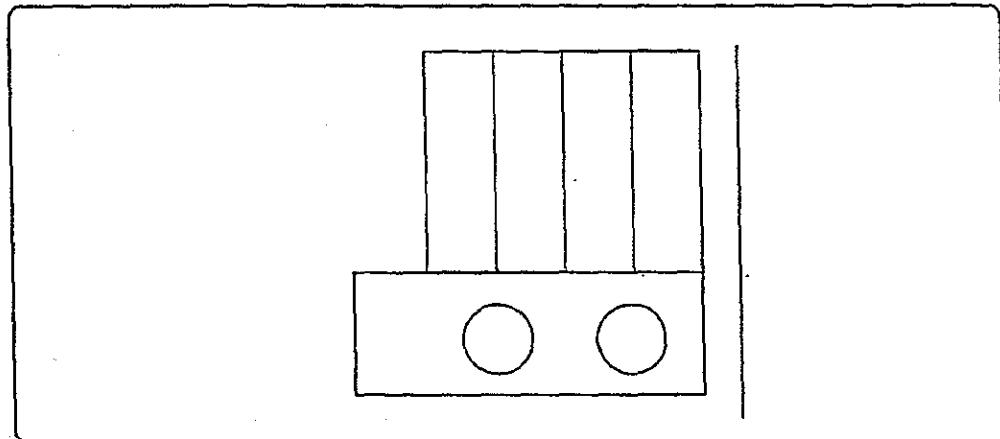
- a) Rinse (8) O-rings (P/N 00138) in isopropyl alcohol and assembly (4) to each balance block assembly.

b) Using a $5/32$ " Allen wrench, secure the two (2) balance block assemblies to the valve block with four (4) screws (P/N 03826).

NOTE

Align balance block assemblies squarely with valve block prior to tightening in place.

Figure 4.6.9

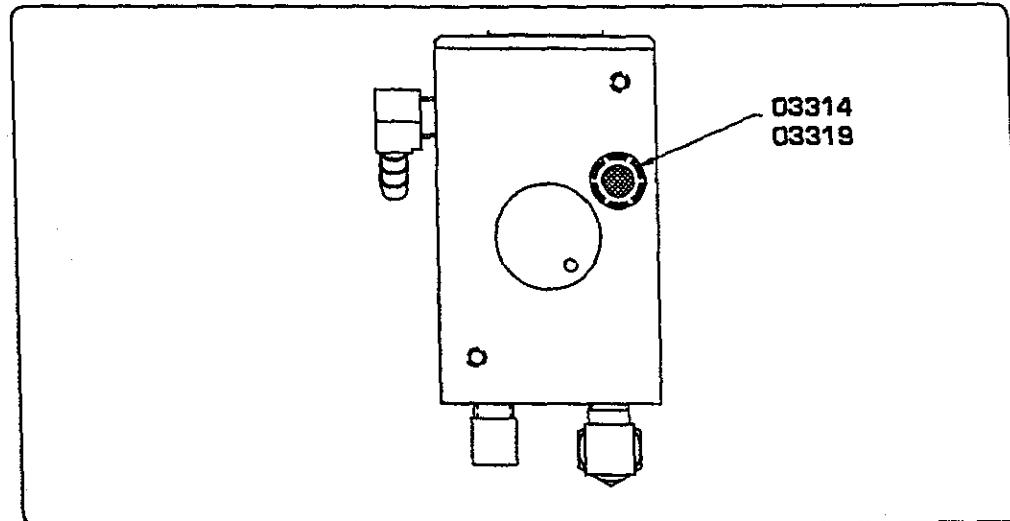


4.6.10 Muffler Assembly

4.6.10.1 Install on (1) muffler (P/N 03319) into valve block bleed port.

4.6.10.2 With a small screwdriver, secure the star retainer over the muffler.

Figure 4.6.10



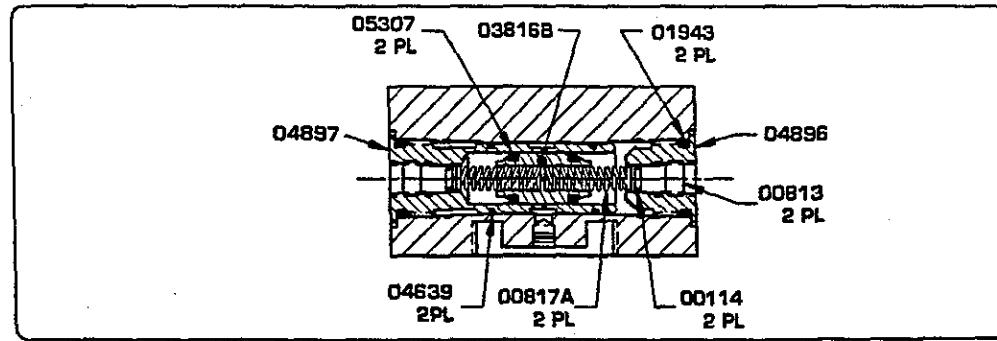
4.6.11 Bypass Assembly (Left/Right Side, Rear)

- 4.6.11.1 Thoroughly lubricate (2) each O-rings (P/N 05307) on bypass poppet (P/N 03816A) with lubricant grease (P/N 03851).
- 4.6.11.2 Install bypass poppet (P/N 03816A) with O-rings into bypass alarm port in valve block.
- 4.6.11.3 Position blender assembly on its side (bypass port facing up) then using a $7/32$ " Allen wrench, install the bypass seat (P/N 03815) into the valve block.

NOTE

Be sure spring (P/N 03817A) passes through bypass seat and is positioned into bypass poppet (P/N 03816A).

- 4.6.11.4 Using a $1/8$ " Allen wrench, screw bypass adjuster (P/N 03813) into bypass seat, until adjuster is slightly recessed into bypass seat.
- 4.6.11.5 Position blender on opposite side and repeat steps to install remaining bypass components.

Figure 3.6.11**NOTE**

Primary outlet spring is shorter than auxiliary spring.

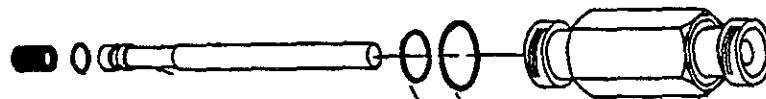
4.6.12 Auxiliary Outlet (Right Side, Front Port)

- 4.6.12.1 Position blender assembly on its side (auxiliary outlet port facing up), then install spring (P/N 03810) into recess in the auxiliary outlet valve block port.

4.6.12.2 Install auxiliary outlet housing (P/N 20221) and poppet into auxiliary outlet port on valve block and hand tighten in place.

4.6.12.3 Using a $11/16$ " open end wrench, tighten assembly to valve block.

Figure 4.6.12



4.6.13 Front and Rear Valve Seat Assembly

4.6.13.1 Prior to installation, place a small amount of Vibra-Tite (P/N 03884) on threads of rear seat (P/N 03855) and let Vibra-Tite (P/N 03884) dry for at least 10 minutes. Then using a $1/8$ " Allen wrench, install rear valve seat into valve block assembly and secure in place.

4.6.13.2 Lubricate spring (P/N 05163B) with lubricant grease (P/N 03851) and insert into rear valve stem (P/N 03821).

4.6.13.3 Using a small pair of needle nose pliers, push rear valve stem with spring into rear valve seat (P/N 03855).

4.6.13.4 Make sure valve stem is hand tightened until light contact is made with front seat. Place front valve/seat assembly in threaded hole and, with spanner wrench (P/N 03849), turn counter-clockwise until threads "click". Then turn clockwise 3 full turns.

WARNINGS !

Do not pressurize system unless the valve/seat has 3 full turns of the threads engaged. Seat can be forcefully ejected by gas pressure if not sufficiently engaged. Do not exceed 3 full turns or rear seat may be damaged.

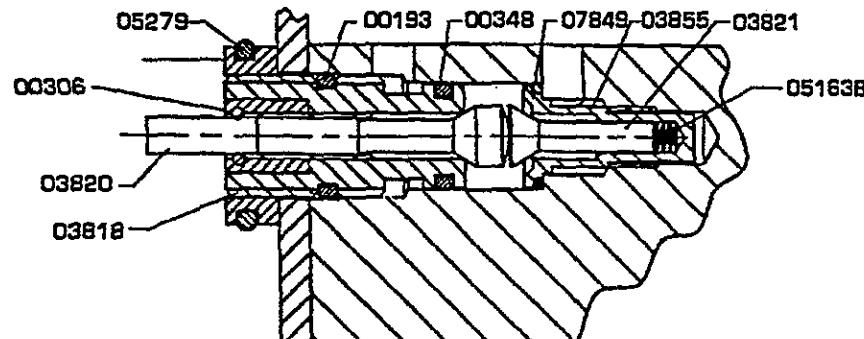
4.6.13.5 Place the front plate assembly on the valve block, aligning the two dowel pins into the valve block.

4.6.13.6 Fasten loosely the lock nut (P/N 03819) on front seat securing the front plate.

4.6.13.7 With the front seat valve stem full counterclockwise, install control knob with black pointer at 21% stop.

4.6.13.8 Using a $9/32$ " nut driver, tighten the collet nut on the control knob to the valve stem.

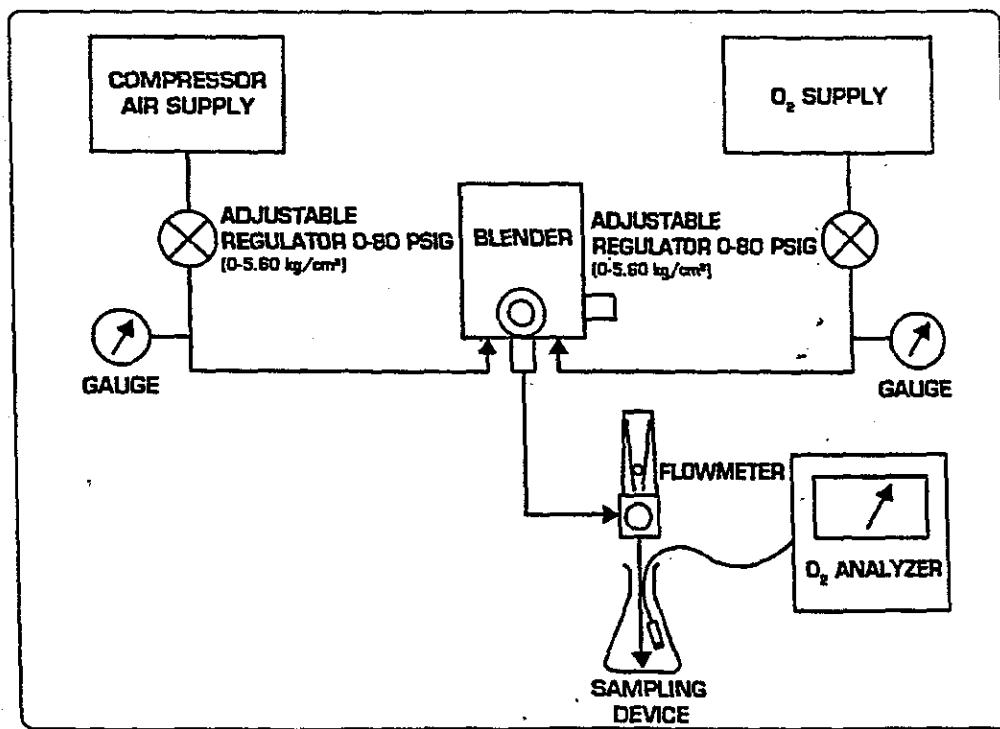
Figure 4.6.13



4.6.14 Set Up Procedure For Testing

The MicroBlender should be tested in a system which closely duplicates the conditions of use for which the blender was designed. Illustrated below is a schematic diagram of the system that should be used to test the MicroBlender.

Figure 4.6.14



4.6.15 Calibration Tools/Equipment:

Thin Bladed Screwdriver of Knife
$\frac{1}{8}$ " Allen Wrench
$\frac{9}{32}$ " Nut Driver
Bird Spanner Wrench (P/N 03849)
$\frac{11}{16}$ " Open End Wrench
Oxygen Regulator (2 Stage, Adjustable 0-80PSIG)
Air Regulator (2 Stage, Adjustable 0-80 PSIG)
Oxygen Flowmeter
90° Elbow Adapter (P/N 00066)
1" Crooked Neck Pole or equivalent
Oxygen Analyzer (analyzer should read in tenths to ensure accuracy of calibration)
Female Post Bracket (P/N 04322)
Oxygen Sampling Hose (P/N 07572)
Hex Nut (P/N 00822)
Tapered Nipple (P/N 00680)
Flowmeter Adapter (P/N 00673)
$1\frac{1}{8}$ " open end wrench
$\frac{7}{8}$ " open end wrench

4.6.16 Air/Oxygen Setup

4.6.16.1 The gas supplies must be clean and dry and have the ability to generate 80PSIG for both air and oxygen inlet pressures.

4.6.16.2 When high pressure tanks are utilized, blow potential debris from the valve; quickly open and close each valve to prevent debris from entering the test equipment.

4.6.16.3 Connect adjustable (0-80 PSIG) air and oxygen regulator to each gas supply securing it with a $1\frac{1}{8}$ " open end wrench.

4.6.16.4 Turn the oxygen and air regulator control knobs to full counterclockwise (CCW) closed position.

4.6.16.5 Secure the air and oxygen high pressure hoses to each regulator using $\frac{7}{8}$ " and $\frac{11}{16}$ " open end wrenches.

4.6.17 Oxygen Analyzer Setup/Calibration

4.6.17.1 The accuracy of the calibration of the 10160 Microblender will depend heavily upon the accuracy of the oxygen analyzer.

4.6.17.2 The oxygen analyzer should have a response time of 10 seconds or less. the analyzer should read in tenths and ideally be of the digital type.

4.6.17.3 Calibrate the oxygen analyzer according to the manufacturers procedure.

4.6.18 Test Equipment Setup

4.6.18.1 Secure a female post bracket (P/N 04322) to a 1" diameter pole.

4.6.18.2 Install male bracket plate to the femal post bracket.

4.6.18.3 Using the two (2) inlet adapters (P/N 05473 and 00086), install the blender to the male bracket plate.

4.6.18.4 Using a $\frac{3}{4}$ " and $\frac{5}{8}$ " open end wrench, tighten the two (2) inlet adapters (P/N 05473 and 00086).

4.6.18.5 Secure the adapter (P/N 00086) to the side outlet of the blender.

NOTE

To avoid damaging the threads of the inlets, do not over-tighten the two (2) inlet adapters (P/N 05473 and 00086).

4.6.18.6 Using a $\frac{5}{8}$ " open end wrench, secure the outlet adapter (P/N 00086) to the side outlet of the blender.

4.6.18.7 Attach the flowmeter to the auxiliary outlet on the blender.

NOTE

Ensure that the flowmeter is turned OFF, (full clockwise) (CW).

4.6.18.8 Secure the tapered nipple (P/N 00680) and hex nut (P/N 00822) to flowmeter outlet.

4.6.18.9 Attach one end of connecting hose (P/N 07572) to flowmeter and other end to bifurcation (P/N 01003). Ensure one-way valve (P/N 06665) is secured into the remaining large opening of bifurcation. Attach remaining outlet of bifurcation to oxygen analyzer probe.

4.6.18.10 The system is now ready for calibration.

4.6.19 Calibration Procedure 10160 MicroBlender

4.16.19.1 Remove control knob, with a $\frac{9}{32}$ " nut driver, loosens collet nut sufficiently until the knob may be removed.

4.6.19.2 Remove control knob and carefully rotate valve stem with fingers counterclockwise (CCW) until valve just seats.

4.6.19.3 Place knob on valve stem shaft with black pointer at 21% stop, and secure with $\frac{9}{32}$ " nut driver.

4.6.19.4 Turn air and oxygen sources ON. Adjust both regulators to a static 50 PSIG and adjust flowmeter to 15 LPM.

4.6.19.5 Rotate control knob clockwise (CW) slowly until oxygen concentration on analyzer stabilizes between 21.1% and 21.5% (DO NOT exceed 21.5%).

4.6.19.6 Hold knob securely with fingers and loosen collet nut, rotate black pointer, counterclockwise (CCW) to 21% stop without turning valve stem.

4.6.19.7 Check oxygen concentration for correct reading and tighten collet nut securely to valve stem with $\frac{9}{32}$ " nut driver.

4.6.19.8 Recheck oxygen concentration after tightening lock nuts and repeat the last three (3) steps.

4.6.19.9 Rotate control knob fully clockwise (CW) to 100% stop position. (If knob will not rotate to 100% stop, the front seat was probably turned in more than three (3) turns).

4.6.19.10 Hold knob securely with fingers and loosen collet nut with $\frac{9}{32}$ " nut driver, then remove knob.

4.6.19.11 With the spanner wrench (P/N 03849), carefully rotate the front seat in a clockwise (CW) direction until the rear stem lightly touches its seat.

NOTE

This can be detected by a sudden increase in resistance to further rotation.

4.6.19.12 Observe the oxygen percentage and allow the analyzer to stabilize before continuing on.

4.6.19.13 Rotate the seat further clockwise (CW), if necessary, until the oxygen concentration exceeds 99.5%, ideally reaching 100%.

4.6.19.14 Tighten the front plate locknut to secure the front plate to valve block assembly, with an $\frac{11}{16}$ " open end wrench (not necessary to hold seat while tightening locknut).

4.6.19.15 Install control knob with black pointer at 100% stop.

4.6.19.16 Using a $\frac{9}{32}$ " nut driver, tighten the collet nut on the control knob to the valve stem.

NOTE

The end points are now calibrated.

4.6.19.17 Rotate control knob counterclockwise (CCW) to 21% stop, allow analyzer to stabilize to confirm that this setting has not changed.

Perform the following checks:

Knob Setting	Pressure Oxy/Air	Percent Concentration
21	50 PSIG/50 PSIG	21.0 - 22.0%
30	50 PSIG/50 PSIG	27.0 - 33.0%
60	50 PSIG/50 PSIG	57.0 - 63.0%
90	50 PSIG/50 PSIG	87.0 - 93.0%
100	50 PSIG/50 PSIG	99.0 - 100%

If concentrations are out of specification, repeat the first eight (8) steps in the Calibration Procedure.

Knob Setting	Pressure Oxygen/Air	Percent Concentration
30	50 PSIG/40 PSIG	27.0 - 33.0%
60	50 PSIG/40 PSIG	57.0 - 63.0%
90	50 PSIG/40 PSIG	87.0 - 93.0%
30	50 PSIG/60 PSIG	27.0 - 33.0%
60	50 PSIG/60 PSIG	57.0 - 63.0%
90	50 PSIG/60 PSIG	87.0 - 93.0%

If concentrations meet specifications, continue on. If concentrations do not meet specifications, repeat the first eight (8) steps in Calibration Procedure.

4.6.19.18 Adjust control knob at 60% oxygen and set air/oxygen pressure each at 50 PSIG.

4.6.20 Alarm Calibration

4.6.20.1 The alarm system is designed to sound an audible tone if the inlet pressures are different by 20 PSIG or more, such as if either source gas failed.

When the Microblender is in the alarm phase, the remaining or high pressure gas is routed to the blender outlet. Some gas will also flow through the alarm reed valve creating an audible tone. This gas then exits out the back of the blender module.

4.6.20.2 Ensure the air and oxygen regulators are adjusted to a static 50 PSIG, align control knob indicator with 60%, and ensure flow meter is set to 15 LPM.

4.6.20.3 Reduce air pressure until the audible alarm sounds. The air pressure should read 28 PSIG (± 2 PSIG).

4.6.20.4 If alarm sounds above this pressure, rotate adjuster clockwise (CW), left side of blender, with a 1/8" Allen wrench until alarm sounds at 28 PSIG (± 2 PSIG).

- 4.6.20.5 If alarm sounds below this pressure, rotate adjuster counter clockwise (CCW), left side of blender, with a $1/8$ " Allen wrench until alarm sounds at 28 PSIG (± 2 PSIG).
- 4.6.20.6 Raise air pressure slowly. Alarm/bypass should reset to normal function before pressure reaches 44 PSIG or above.
- 4.6.20.7 Restore air pressure to 50 PSIG and reduce oxygen pressure until the audible alarm sounds. The oxygen pressure must be 28 PSIG (± 2 PSIG).
- 4.6.20.8 If alarm sounds above this pressure, rotate adjuster clockwise (CW), right side of blender, with an $1/8$ " Allen wrench until alarm sounds at 28 PSIG (± 2 PSIG).
- 4.6.20.9 If alarm sounds below this pressure, rotate adjuster counterclockwise (CCW), right side of blender, with an $1/8$ " Allen wrench until alarm sounds at 28 PSIG (± 2 PSIG).
- 4.6.20.10 Raise oxygen pressure slowly. Alarm/bypass should reset to normal function before pressure reaches 44 PSIG or above.

4.6.21 Inlet Block Check Valve Leak Test

- 4.6.21.1 Disconnect oxygen hose assembly from gas source. Remove assembly from gas source. Remove all connections from blender outlets to ensure that there is no outlet flow from blender.

4.6.22 Installation of Control Knob Friction O-ring

- 4.6.22.1 Rotate control knob fully to 100% position.

- 4.6.22.2 Using a $9/32$ " nut driver, loosen collet nut and remove control knob.

- 4.6.22.3 Using lubricant (P/N 00631) install lubricated O-ring (P/N 05279) on front seat lock nut (P/N 03819).

- 4.6.22.4 Push control knob onto front valve stem, seating it fully on the lock nut O-ring with the black pointer at the 100% position. Be careful not to rotate valve stem.

4.6.22.4 Tighten the collet nut securely, using a $9/32$ " nut driver.

4.6.22.5 Snap control knob cap into control knob.

4.6.22.6 Recheck 100% - 21% O₂ concentration.

4.6.22.7 Disconnect both high pressure lines from blender, remove blender from test assembly. Calibration is not complete.

Prior to placing the 10160 MicroBlender into clinical use, perform the following test:

After satisfactory completion of the Performance Check, refer to Section 2.0, Operating Instructions.

If the 10160 MicroBlender does not function as described below, contact your Bird distributor or Bird Products Corporation, 1100 Bird Center Drive, Palm Springs, California 92262, (619) 778-7200 or (800) 328-4139. DO NOT use the Blender until correct performance is verified. Use setup procedure as described in section 3.3.

4.6.23 Replacement Parts

Part Number	Description	Qty Required
* 00114D	O-Ring (.117 X .040)	2
* 00138D	O-Ring (.176 X .070)	10
* 00143D	O-Ring (.239 X .070)	1
* 00193D	O-Ring (.364 X .070)	1
* 00306D	O-Ring (.114 X .070)	3
* 00348D	O-Ring (.301 X .070)	1
0770D	Ball, $3/16$ " Diam.	4
00822	Nut, $3/16$ " - 18 Hex	1
01866	Reed Alarm Plate	1
03310	Spring, .21 X .16 X .25LG	1
03312	Poppet Check Valve	1
* 03314D	Ring, Rng, Int., .39	1
* 03319	Muffler Bead	1
03805A	Balance Block MicroBlender	4
03806	PPT, Check Valve, MicroBlender	1



SECTION 4.0: MAINTENANCE AND SERVICE

Part Number	Description	Qty Required
03807A	Block, Vlv MicroBlender, W/Plugs	1
* 03808D	O-Ring (.4681D X .078)	4
03809	Conn. Aux. Outlet 02, 1/4 BPT	1
03810	Spring, .210 X .156 X .437	1
03811	Reed Alarm MicroBlender Retainer	1
03812	Duckbill Check Valve MB Retainer	1
03813	Bypass Adjuster	2
03815	Bypass Valve Seat	2
**03816A	Bypass, PPT	1
**03817A	Spring (.148OD X .500)	2
03818	Front Valve Seat	1
03819D	Nut, Front Seat	1
03820	Stem, Valve Front, MicroBlender	1
03821	Valve Stem, Rear	1
03825D	Screw, 10-32 X .75 Hex Soc Hd	8
03826D	Screw, 10-32 X 2.25 Hex Soc hd	4
03829	Cap, Balance Block	5
03833	Air Inlet Connector	1
03834L	Conn, $9/16$ - 18 LH X $9/16$ - 18 LH, O ₂	1
03835L	Conn, $7/16$ - 27 X $9/16$ - 18 LH, O ₂	1
03837	Nipple, O ₂ Conn	1
03838	Hsng, Check Valve MicroBlender	1
03840	Plate, Front Asy, MicroBlender	1
03854	Knob, Asy, MicroBlender Ctrl	1
03855	Rear Seat Valve	1
* 03858A	Diaphragm, Assembly	1
03859D	Spring (.118OD X .450LG)	2

* Indicates parts are contained in Maintenance Kit, P/N 3411.

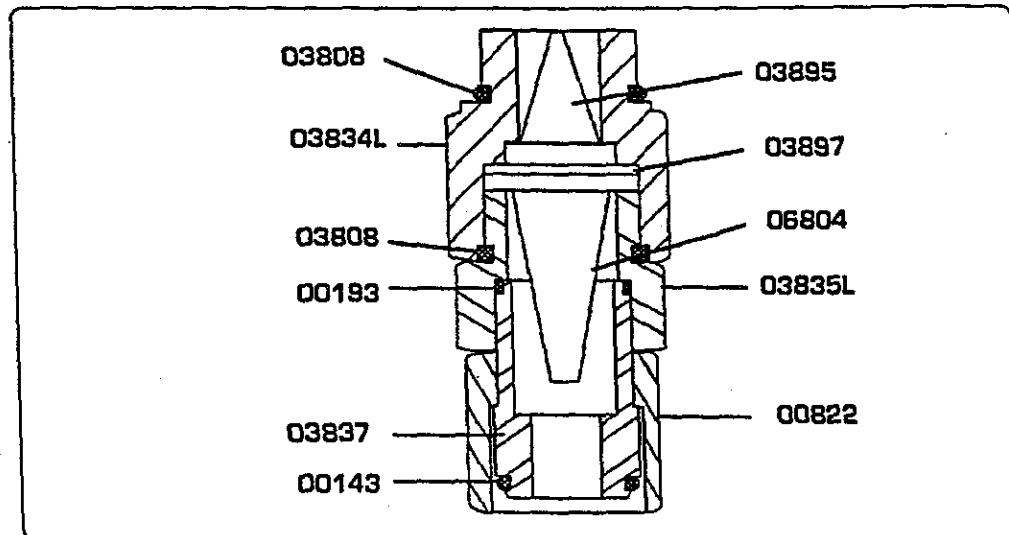
** 1000312-18

4.7 ASSEMBLY

4.7.1 Oxygen Inlet Assembly P/N 03864L

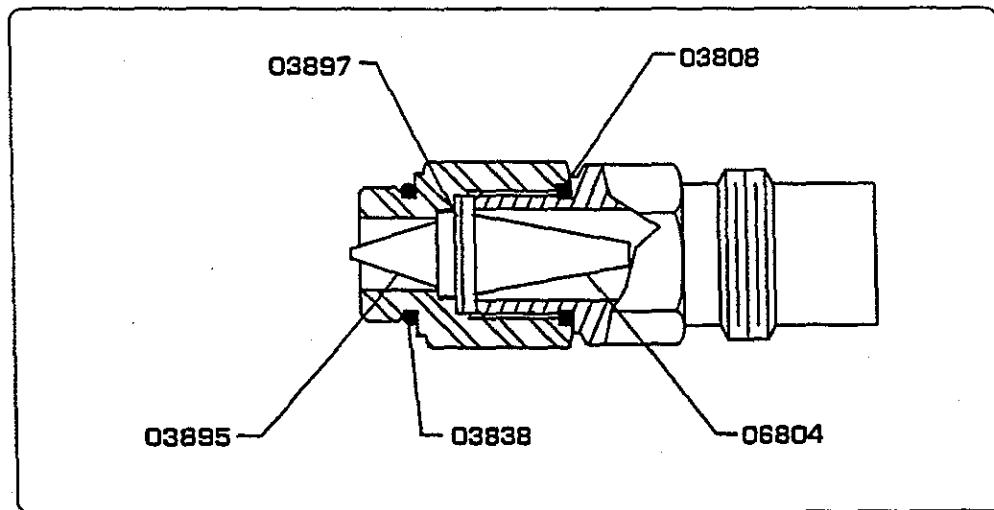
- 4.7.1.1 Lightly lube O-rings (P/N 03808) using Bird lubricant (P/N 00631) and install onto the O₂ connector (P/N 03843L).
- 4.7.1.2 Insert duckbill check valve (P/N 03895), washer (P/N 03897), and nylon cone filter (P/N 06804) into the O₂ connector (P/N 03834L).
- 4.7.1.3 Lightly lube O-ring (P/N 03808) and o-ring (P/N 00193) using Bird lubricant (P/N 00193) using Bird lubricant (P/N 00631) and install on O₂ filter retainer (P/N 03835L).
- 4.7.1.4 Using two (2) $\frac{3}{4}$ " open end wrenches, tighten the O₂ connector (P/N 03834L) to the O₂ filter retainer (P/N 03835L) using a counter clockwise motion (CCW).
- 4.7.1.5 Install the O-ring (P/N 00143) onto the O₂ inlet nipple (P/N 03837).
- 4.7.1.6 Insert the O₂ inlet nipple (P/N 03837) into the nut (P/N 00822).
- 4.7.1.7 Using a $\frac{3}{4}$ " open end wrench and a $\frac{1}{8}$ " Allen driver, tighten the O₂ inlet nipple to the O₂ connector (P/N 03835L) in a clockwise motion (CW).
- 4.7.1.8 Set the O₂ inlet assembly (P/N 03864L) aside for final assembly to the inlet block (P/N 33519).

Figure 4.7.1



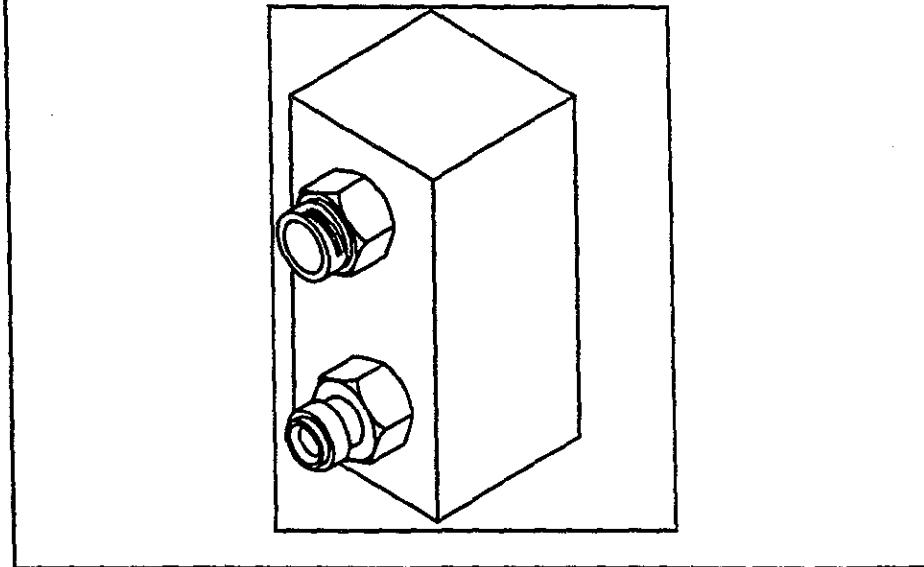
4.7.2 Air Inlet Assembly

- 4.7.2.1** Lightly lube the O-rings (P/N 03808) using Bird lubricant (P/N 00631) and install onto the filter retainer (P/N 20034) and on the air inlet (P/N 03833).
- 4.7.2.2** Insert duckbill check valve (P/N 03895), washer (P/N 03897), and nylon cone filter (P/N 06804) into the filter retainer (P/N 20034).
- 4.7.2.3** Using two (2) $\frac{3}{4}$ " open end wrenches, tighten the filter retainer (P/N 20034) to the air inlet (P/N 03833) in a clockwise motion (CW).
- 4.7.2.4** Set the air inlet assembly (P/N 10078) aside for the final assembly to the inlet block (P/N 33519).

Figure 4.7.2b**4.7.3 Inlet Block Assembly P/N 33519**

- 4.7.3.1** Using a $\frac{9}{16}$ " open end wrench, install the one (1) outlet port connectors (P/N 04859) into the lower port.
- 4.7.3.2** Using a $\frac{5}{8}$ " open end wrench install the O₂ outlet port (P/N 00610) into the upper port.
- 4.7.3.3** Using a $\frac{3}{4}$ " open end wrench, install the oxygen inlet (P/N 03864L) into the upper inlet port and tighten in a counter clockwise motion (CCW).

Figure 4.7.2a



- 4.7.3.4 Using a 3/4" open end wrench, install the air inlet (P/N 10078) into the lower inlet port and tighten in a clockwise motion (CW).
- 4.7.3.5 Set inlet block (P/N 33519) aside for final assembly to casting.

4.7.4 Jet Pump Assembly P/N 15009

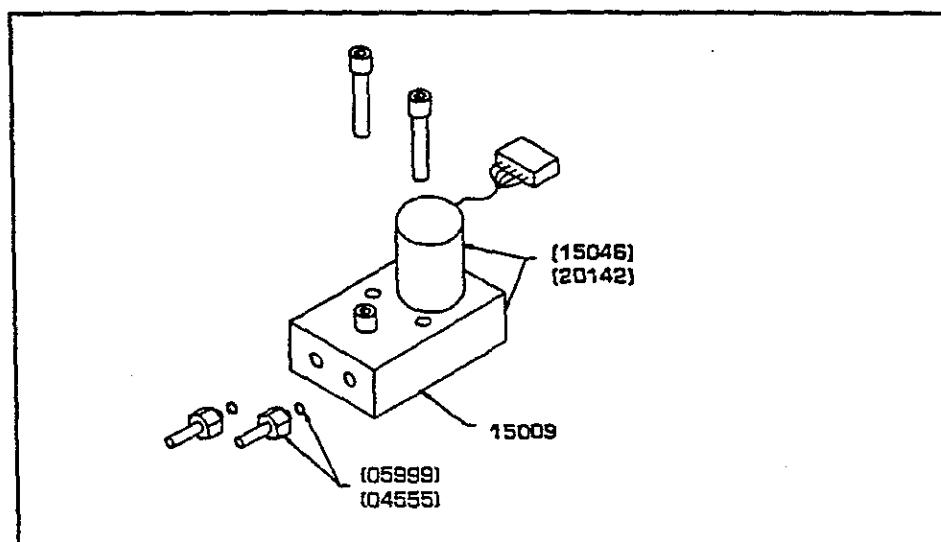
- 4.7.4.1 Install O-ring (P/N 00328) into the right side port of jet pump block (P/N 20142).
- 4.7.4.2 Carefully push orifice (P/N 08171) into right side port securing orifice into O-ring (P/N 00328).

NOTE

Some Jet Pump assemblies only have one barbed fitting (right hand side only).

- 4.7.4.3 Lightly lube two (2) O-rings (P/N 05999) and install onto the two (2) barb connectors (P/N 04555).
- 4.7.4.4 Using a 5/16" deep socket install and tighten the two (2) barb connectors to the jet pump block (P/N 20142).
- 4.7.4.5 Lightly lube O-ring (P/N 00114) using Bird lubricant (P/N 00631) and install onto the plug (P/N 01470).
- 4.7.4.6 Using a flat blade screw driver, install plug (P/N 01470) into the jet pump block (P/N 20142).

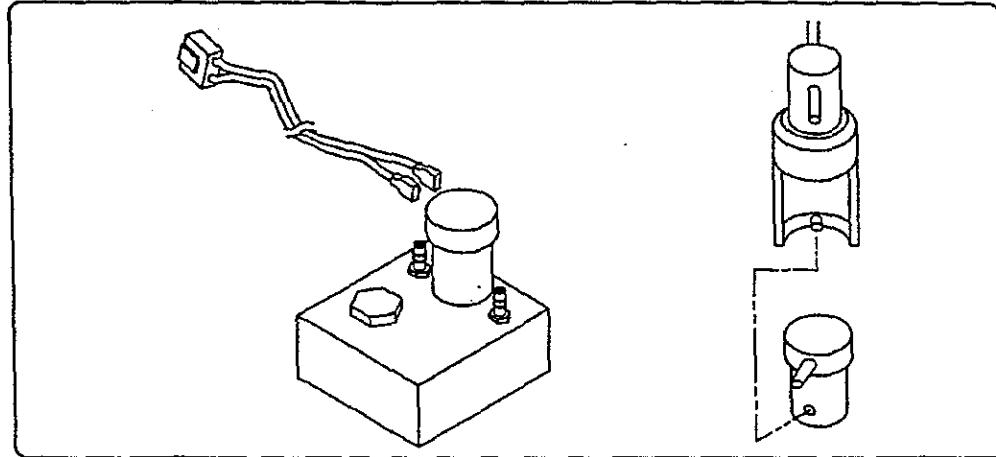
- 4.7.4.7 Before installing solenoid, verify o-rings are on the solenoid. Lube o-rings with Bird lubricant (00631).
- 4.7.4.8 Using the special solenoid wrench (P/N 034260), install and tighten solenoid (P/N 15046) onto the jet pump block (P/N 20142).
- 4.7.4.9 Set jet pump assembly (P/N 15009) aside for final assembly.

Figure 4.7.4**4.7.5 Safety Solenoid Assembly P/N 15013**

- 4.7.5.1 Install O-ring (P/N 03808) onto the plug (P/N 33527).
- 4.7.5.2 Using a 11/16" open end wrench install plug (P/N 33527) and tighten into safety solenoid block (P/N 20145).
- 4.7.5.3 Using the special solenoid wrench (P/N 03426), install and tighten solenoid onto the safety solenoid block (P/N 20145).
- 4.7.5.4 Lightly lube two (2) O-rings (P/N 00114) and install onto the two (2) barb connectors (P/N 00576).
- 4.7.5.5 Using a 1/4" deep socket, install and tighten the two (2) barb connectors (P/N 00576) onto the safety solenoid block (P/N 20145).

4.7.5.6 Set safety solenoid assembly (P/N 15013) aside for final assembly.

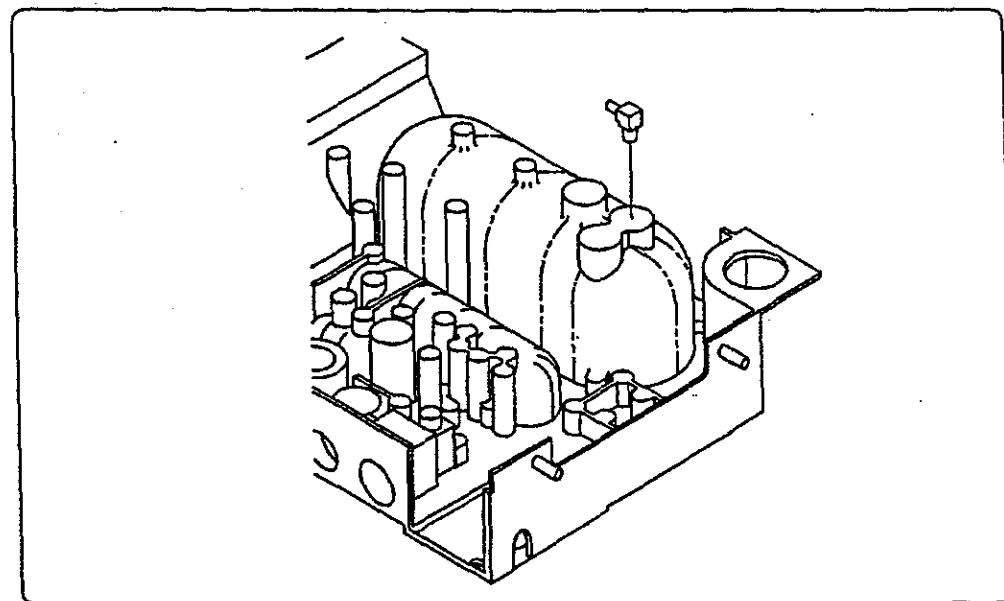
Figure 4.7.5



4.7.6 Inlet Elbow P/N 33615

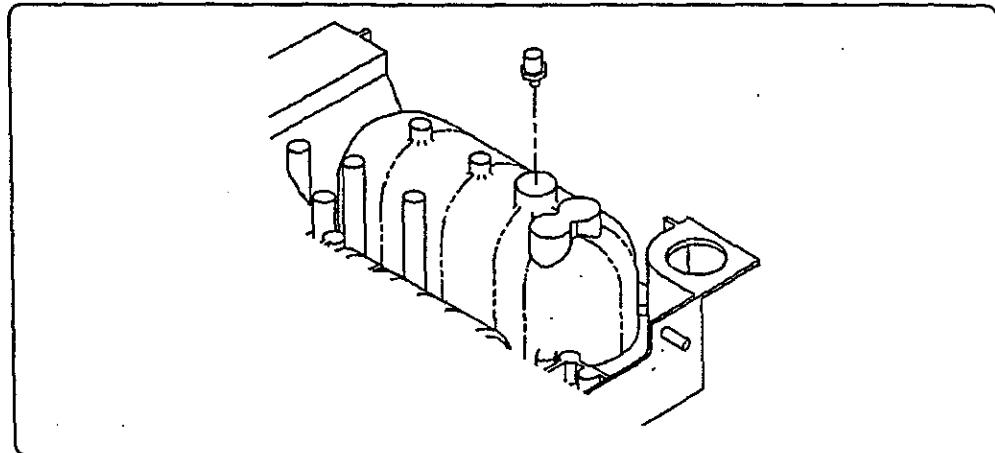
4.7.6.1 Using a $5/8$ " open end wrench, install and tighten the inlet elbow (P/N 33615) into the right side port of the main accumulator.

Figure 4.7.6



4.7.7 100 PSI Pressure Relief Valve P/N 09784

4.7.7.1 Using a $5/8$ " open end wrench, install and tighten the pressure relief valve (P/N 09784) into the left side port of the main accumulator.

Figure 4.7.7**4.7.8 Casting Sealing O-rings P/N 30001, 30002, 30003, 30004, 03021**

4.7.8.1 Make certain all sealing O-rings are clean and free of link or dust.

4.7.8.2 Position O-ring (P/N 30001) into the groove around the main accumulator.

4.7.8.3 Position O-ring (P/N 30002) into the groove around the damping chamber.

4.7.8.4 Position O-ring (P/N 30004) into the groove around the safety and relief port area.

4.7.8.5 Position O-ring (P/N 03021) into the groove around flow valve port area.

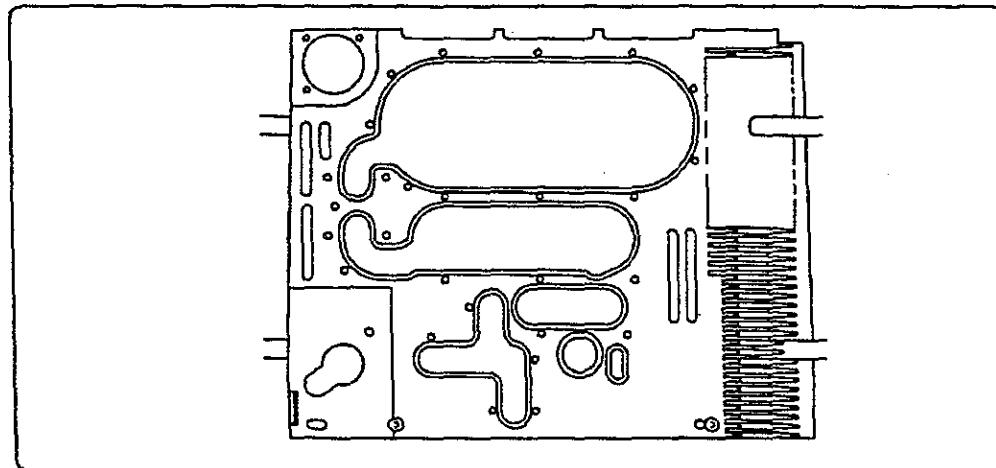
4.7.8.6 Position O-ring (P/N 30003) into the groove around purge valve port area.

4.7.9 Sealing Plate P/N 20126

4.7.9.1 Very carefully position sealing plate over sealing area. Take care not to disturb the sealing O-rings.

- 4.7.9.2 Install two screws (P/N 40002) finger tight to hold sealing plate in place.
- 4.7.9.3 Install the remaining twenty one (21) screws into sealing plate finger tight.
- 4.7.9.4 Using a $5/32$ " Allen driver, tighten screws down just until screw head meets the sealing plate.
- 4.7.9.5 For the final tighten sequence, work in and outward motion. Begin with the inner most screws and work out to the edge of the sealing plate.

Figure 4.7.9



4.7.10 Casting Leak Test

- 4.7.10.1 Turn casting over with front label facing you.
- 4.7.10.2 Attach regulator bypass fixture (P/N 10287) to pressure regulator mounting pad and secure with four $9/64$ " Allen screws (P/N 03217), insert screw from bottom through sealing plate.
- 4.7.10.3 Attach accumulator test fixture (P/N 10288) onto flow control, jet pump and safety solenoid mounting pads, evenly and secure using the three (3) knuckled fastening screws on the fixture.
- 4.7.10.4 Attach and secure test fixture (P/N 10285) onto the safety valve mounting pad using two (2) $7/64$ " Allen screws (P/N 03219).

- 4.7.10.5 Install and secure the out patient port plug (P/N 10284) using two (2) $\frac{3}{32}$ " Allen screws (P/N 40013).
- 4.7.10.6 Install and secure the pressure relief port plug (P/N 10286) using two (2) $\frac{7}{64}$ " Allen screws (P/N 03219)
- 4.7.10.7 Install and secure brass plug (P/N 01470) onto mounting pad located at the pressure relief inlet port.
- 4.7.10.8 Install 0-60 psi (0-4.2 kgcm²) pressure test harness to supply source, make certain that the pressure regulator is turned OFF full counter clockwise (CCW) to prevent damaging the gauge.
- 4.7.10.9 Install and secure with hose clamp, (P/N 09787) test harness hose to inlet elbow on main accumulator.

NOTE

Turn rotary on/off valve to OFF position.

- 4.7.10.10 Turn gas supply ON.

- 4.7.10.11 Turn rotary on/off valve to ON position.

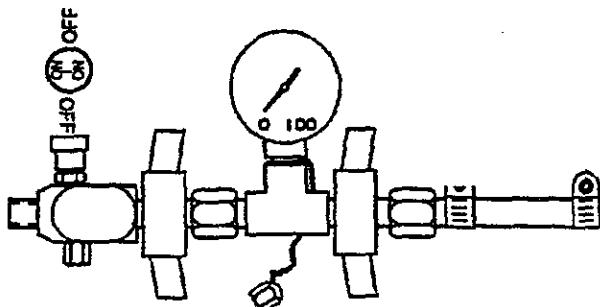
- 4.7.10.12 Slowly turn test harness regulator clockwise (CW) to read 50 PSIG (3.5 kgcm²) on test harness gauge.

- 4.7.10.13 Turn rotary on/off valve to OFF and observe pressure behavior on test harness gauge. If pressure decays more than two (2) PSI per minute, check for leak. If pressure remains stable, system is leak tight. Relieve gas pressure from casting.

4.7.10.14 Troubleshooting:

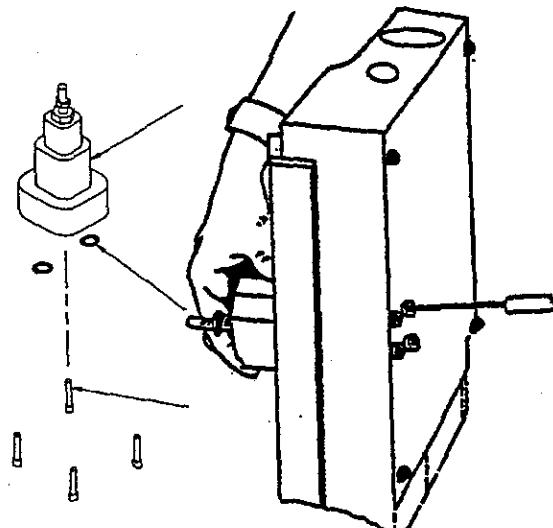
- a) Check for leaks at all test fixture sealing areas.
- b) Check for leaks in pressure test harness.
- c) Check and re-tighten if necessary all sealing plate screws.
- d) If leak still persists, change all sealing O-rings and repeat leak test.

Figure 4.7.10



4.7.11 Pressure Regulator P/N 33566

- 4.7.11.1** Remove regulator bypass fixture (P/N 10287) from regulator mounting pad.
- 4.7.11.2** Position two (2) O-rings (P/N 03375) into the counterbore area at the bottom of the regulator.
- 4.7.11.3** Position the regulator onto the mounting pad with bleed fitting facing towards the front of the casting.
- 4.7.11.4** Using four (4) $9/64$ " Allen screws, (P/N 03257) secure regulator to the mounting pad. Insert screws from the bottom through the sealing plate.



4.7.12 Regulator Calibration P/N 33566

4.7.12.1 Remove brass plug (P/N 1470) from mounting pad located at the pressure relief valve and install barb connector (P/N 00576) and secure PSIG (0-2.1 kgcm²) precision test gauge or equivalent to barb connector (P/N 00576).

4.7.12.2 Turn rotary on/off valve to ON and slowly increase test harness regulator to 50 PSIG (3.5 kgcm²).

4.7.12.3 Regulator operating pressure as observed on 0-30 PSIG gauge, must read 25 PSIG \pm .5 PSI (1.7 kgcm² \pm .035 kgcm²).

4.7.12.4 To adjust regulator, loosen locknut on regulator and adjust valve stem using a flat blade screw driver.

4.7.12.5 Resecure locknut using Vibratite (P/N 03884) or equivalent locking material.

4.7.12.6 Troubleshooting:

a) Cannot adjust to 25 PSIG (1.7 kgcm²).

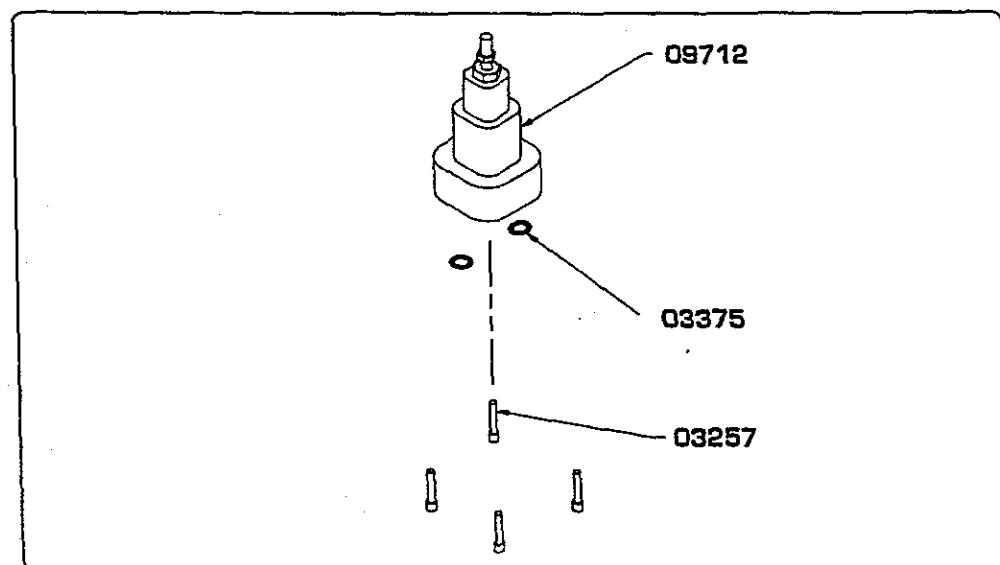
b) Confirm 50 PSIG (3.5 kgcm²) gas supply.

c) Check for leaks at all possible leak areas.

d) Replace regulator and repeat test.

After testing is complete, remove pressure test harness and all test fixtures.

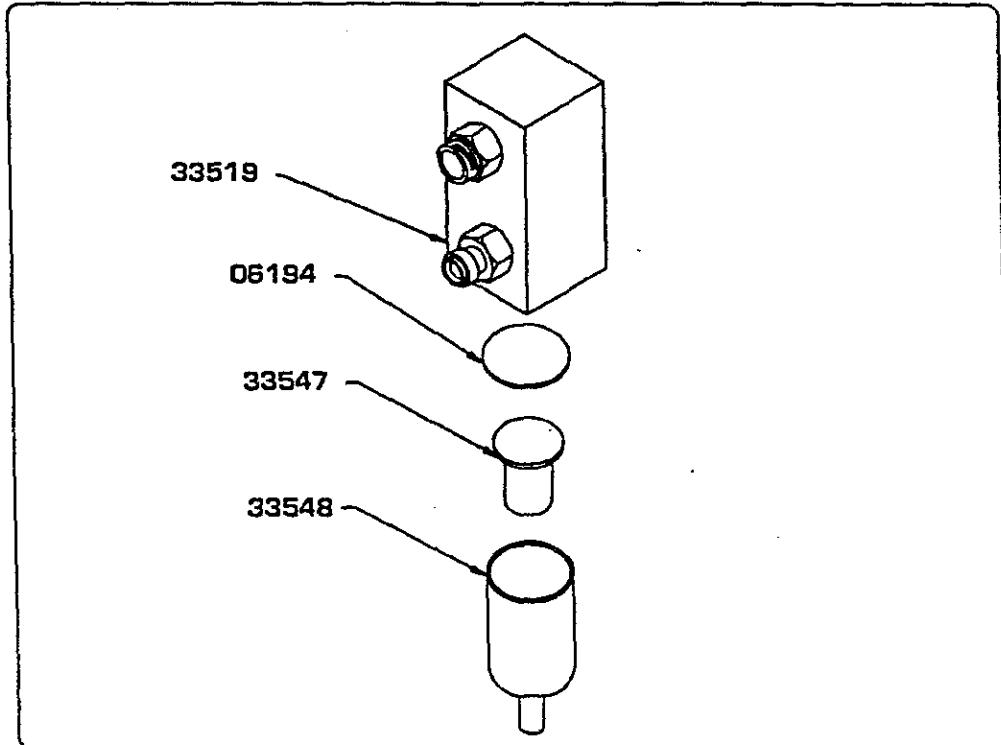
Figure 4.7.12



4.7.13 Inlet Block Assembly P/N 33519

4.7.13.1 Using a $7/64$ " Allen driver, install and secure to the casting the inlet block assembly using three (3) Allen screws (P/N 03219).

Figure 4.7.13



4.7.14 Barbed Tube Connector P/N 00576

4.7.14.1 Lightly lube and install O-rings (P/N 00114) onto the three (3) barb tube connectors.

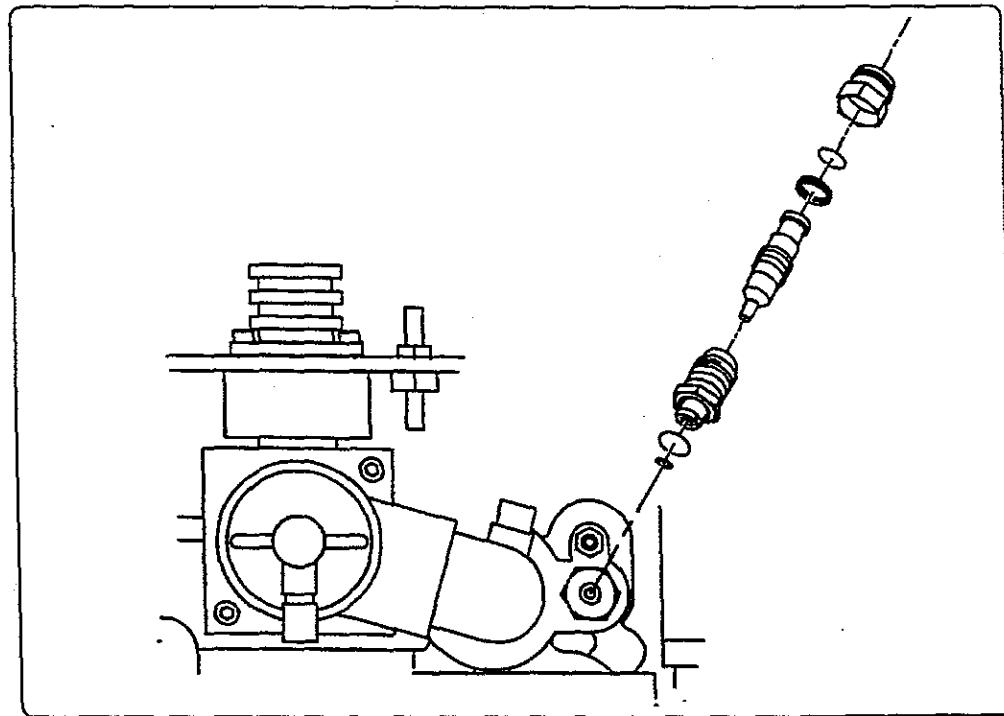
4.7.14.2 Using $1/4$ " deep socket driver, install the three (3) barb tube connectors to their mounting pads as follows:

- a) Install one at the inlet port on the pressure relief valve.
- b) Install one at the inlet port next to the purge valve (P/N 10180).
- c) Install one behind the regulator (P/N 33566) and alongside the main accumulator.

4.7.15 Purge Valve Assembly P/N 10180

- 4.7.15.1 Install nylon washer (P/N 00109) and O-ring (P/N 00138) on valve stem.
- 4.7.15.2 Install O-ring (P/N 07849) on valve body and the non-lubricated O-ring (P/N 00114) on inside front end of valve body.
- 4.7.15.3 Install valve stem with washer and O-ring into valve body.
- 4.7.15.4 Using two (2) $1\frac{1}{2}$ " open end wrench, tighten valve cap to valve body.
- 4.7.15.5 Using a $\frac{1}{2}$ " deep socket, install and secure purge valve assembly (P/N 10180) into the casting.
- 4.7.15.6 At this time using a $\frac{3}{32}$ " Allen driver rotate purge valve stem full counter clockwise (CCW).

Figure 4.7.15



4.7.16 Safety Valve Assembly P/N 09754

- 4.7.16.1 Insert short leg of silicone elbow (P/N 09603) into side port of safety valve body with second ridge to the notch.
- 4.7.16.2 Install elbow fitting (P/N 04006) of regulator purge tube assembly (P/N 08934) into silicone elbow.